Connecting Mobile Game Advertising with Local Stores

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Abstract

With the growth of mobile market, mobile advertising and mobile game advertising are becoming more and more important. On one hand, mobile advertising is able to deliver relevant ads to targeted users based on their locations and behaviors. On the other hand, as the number of mobile game players and free-to-play mobile games are increasing, mobile game advertising forms one important way of monetization. It is important to increase the advertising effectiveness while producing friendly user experience.

Local stores find themselves difficult to keep up with the pace of the Internet. The research on mixed reality merges communications between the real and virtual worlds, which could create a friendly user experience. The author has tried to use mobile game advertising to help local shops to increase their sales and brand awareness by merging the game play with the real items in local stores.

This thesis presents a solution to connecting mobile game advertising with local stores. It uses virtual assets of games as incentives to encourage players to view ads and to have purchase behaviors in local stores. Furthermore, a prototype as a proof of concept has been implemented, using QR codes as a portal for players to claim rewards from local stores. In addition, the author interviewed two owners of local shops, and received positive feedback on the prototype.

Key words: game advertising, mobile game advertising, mixed reality, QR code, user experience, user interaction

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1. Introduction

Imaging that our smart phone is about to run out of battery in any minute, but there is nowhere to charge. Will it drive you crazy? Mobile digital world has penetrated our life style everywhere. A person without a smart phone will act like a caveman. People used to contact their friends by putting coins in public telephone and left messages to beepers. Where is the beeper now? Even pay phones are being turned into Wi-Fi hotspots (Knutson, 2016).

With trend of the mobile Internet, mobile advertising is developing fast and outperforming traditional online advertising. The traits of mobile devices and their applications such as constant connected, personal devices and location-based services help improving the effectiveness of advertising. Moreover, as users are in positive and casual moods when they are playing mobile games, advertising in mobile game also has become successful (eMarketer, 2015). Games may use their virtual assets as rewards and motivation for players to finish viewing the advertisements (as known as ads). Unity Ads (2016) shows that 54% of players preferred to get rewarded after watching video ads. However, some of mobile game advertising methods are considered as unfriendly and intrusive that may damage the game experience (Wei and Wu, 2014).

Along with the rapid development of communication technology and mobile applications of mobile devices, mixed reality (Milgram et al., 1995), which merges scenes between tangible real world and digital virtual world, forms a hot topic in both academia and industry. It provides the sense of presence, high fidelity or imagination sparking.

After researching, the author found out several motivations and objectives to create a new form of mobile game advertising connecting with local stores with mixed reality. Firstly, small and medium-sized enterprises such as local stores are not having proper adoptions to use online tools to promote marketing activities (Meske and Stieglitz, 2013) They are still seeking a convenient way to adopt their business with online advertising. Secondly, not all players are comfortable to spend real money in virtual games (Mäntymäki and Salo, 2015). It is an opportunity to find out a compensated method for players to earn virtual assets in a game from the real world, other than merely purchasing them with real money. Thirdly, an optimal advertising performance includes good advertising effectiveness and good user experience (Rohrer and Boyd, 2004). Merging the real and virtual worlds with advertising is a possible way to improve the user experience (Olsson et al., 2011). Moreover, with proper rewards, ads are more acceptable for customers (Leppaniemi and Karjaluoto, 2005).

Thus, two research questions of this thesis topic include a) what are the possible ways of merging local stores and games in advertising and b) how to develop a tool that

connects mobile game advertising with local stores. Through literature review, analysis and prototype implementation, this thesis discusses how to utilize mixed reality for improving user experience in mobile game advertising. Furthermore, a prototype of connecting mobile game advertising with brick and mortar is implemented.

In the next chapter, online advertising will be discussed. In Chapter 3, categories of game advertising are introduced and a reformed game advertising conceptual framework is presented. In Chapter 4, factors on advertising performance are discussed. In Chapter 5, mixed reality is introduced and how to merge the real and virtual worlds with advertising. In Chapter 6, it processes how to use QR codes to connect mobile games and tangible rewards. In Chapter 7, it provides implementation of the proposed solution. Moreover, a discussion with interviews of local stores is included. Finally, conclusion is in Chapter 8.

2. Online Advertising

Online advertising is a form of advertising uses the Internet as a channel to convey marketing messages to customers (Drake, 2011). It is not only derived from offline advertising (or advertising in conventional media), but also different from it. Online advertising becomes dominating the whole advertising and marketing fields. For example, Facebook managed to have 2 million advertising partners (Facebook, 2016a) and Google has doubled the number. There are three significant advantages for online advertising to outperform others. Firstly, over 3.2 billion people use the Internet which is almost half of the world's population. Such a wide channel shows great opportunities to reach larger quantities of audience. Secondly, it is faster and wider to deliver marketing messages through the Internet, comparing to conventional media such as newspaper and magazines. Online advertising is in digital forms which does not require printing, logistics and even time schedule. Especially, with the help of online advertising network companies (ad networks), advertisers can deploy their ads to different publishers in a single online portal. Last not least, due to the advanced tracking and data analysis technology, ads can be delivered to certain targeted customers. It can be categorized into contextual targeting, demographic targeting and behavioral targeting (Goldfarb, 2013). Targeting audience properly can maximize the effectiveness of ads.

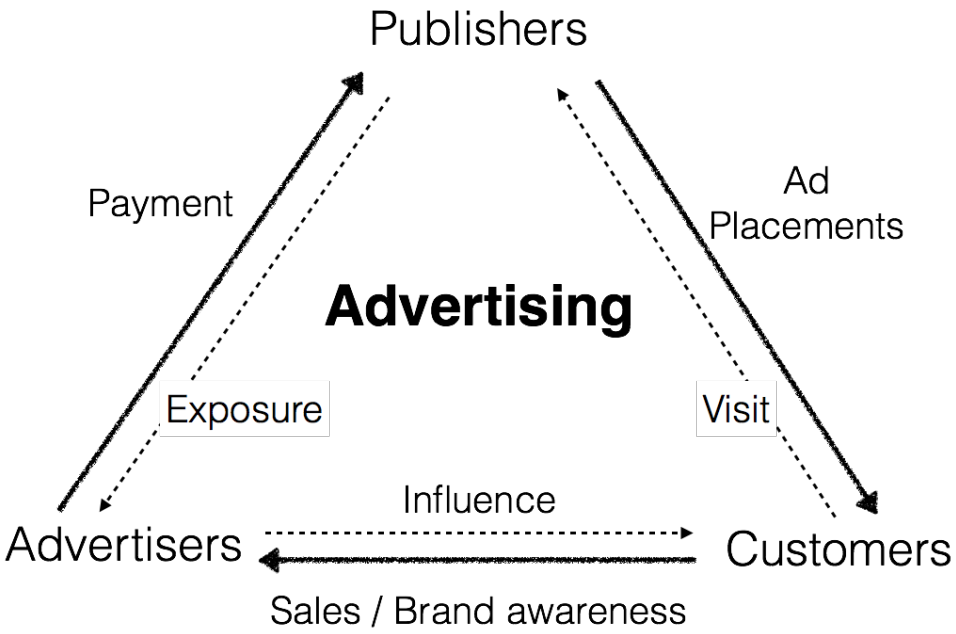

Figure 1 Relationships between advertisers and publishers in advertising

Advertising is all about promoting brands and products to potential customers. As shown in Figure 1, there are three essential roles involved: publishers, advertisers and customers. Publishers represent their own media which have certain types and groups of customers such as loyal readers, audience or fans. Publishers can monetize their media by costing customers as well as advertisers. An advertiser is to promote commercial

messages through publishers' channel, in order to increase sales, awareness or exposure. Customers represent broadly as potential customers who will potentially purchase advertised items, loyal customers who are in favor of the brands or products. There is a series of steps to convert a person from unawareness of the existence of a product or service, to preference and finally to actual purchase. Any marketing activities that motivate potential customers moving to further steps are advertising (Lavidge and Steiner, 2000). Advertising helps advertisers to build brand influence and increase sales from customers.

Advertisers pay publishers for advertising placements (ad placements) in order to increase sales or brand awareness from customers, while publishers expose advertisers' ads to influence customers when they are visiting publishers' contents. Thus, publishers and advertisers are a pair of coevolutionary symbionts. From the marketing perspective, publishers are the channels between advertisers and customers. On one hand, publishers help to increase the sales expected by advertisers. By exposing a brand and a product to potential customers, along with marketing information like good copywriting, ads encourage purchasing behaviours to be occurred and increase brand awareness. On the other hand, advertisers pay publishers according to what measure methods they agree to use.

Bringing advertising on the Internet not only acquires global audience, but also changes the contents from paper-printed into digital forms. Online advertising stimulates sales more effectively due to ads can be seen by appropriate target groups (Goldfarb, 2013). Comparing with conventional media such as newspaper, magazine or television, the price of advertising slots are estimated by circulation or audience ratings.

As the financial report of Facebook's fourth quarter of 2015 shows, it got revenue from advertising was $5.64 billion, a 57% increase from the fourth quarter in 2014 (Facebook, 2016b). Mobile advertising revenue represented approximately 80% of advertising revenue, up from 69% of advertising revenue in the fourth quarter of 2014. 'IAB internet advertising revenue report (IAB, 2015), full year 2014' in Figure 2, shows a strong evidence of mobile market trend. During 2014, mobile advertising in the United States totaled $12.5 billion, up 76% from $7.1 billion in the prior year. It shows since 2010, internet advertising growth was increased by a 110% compound annual growth rate(CAGR) in Mobile, meanwhile non-Mobile revenue hit only 10 % growth in non-Mobile revenue comparatively. The growth of Online advertising indicates an increasing number of advertisers are showing interests in it.

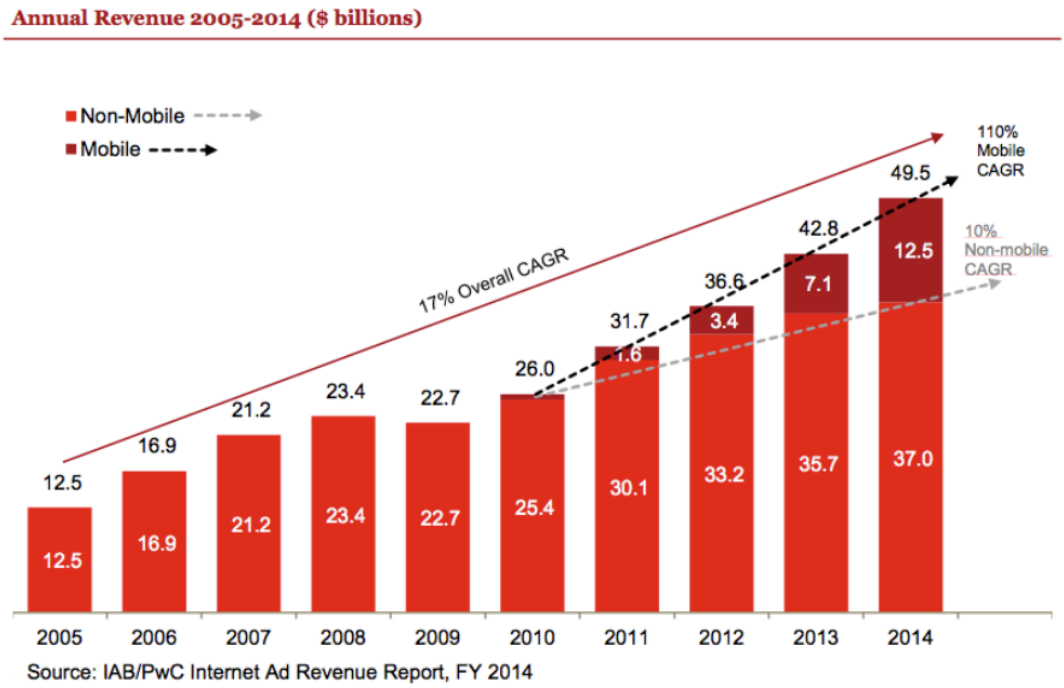

Figure 2 Internet Advertising Annual Revenue 2005-2014 (IAB, 2015)

Online advertising is a wide concept. There are different types of online advertising depending on how to categorize them. For example, base the media as the advertising carrier, online advertising can be divided into web advertising, game advertising, email advertising and advertising in applications etc. (Zeff and Aronson, 1999). However, this thesis is concentrated on the performance of advertising in mobile games.

Before smart mobile devices are widely used in people's daily life, online advertising is mainly accessed on desktop devices, such as desktop computers, laptops and game consoles. It shares the same history with online advertising before mobile advertising was derived. It started with displaying banner ads on websites. Banner, as known as banner ad or banner advertising, is a rectangular-shaped graphical ad with a link of an advertiser's website, which placed either above, below or on the sides of a web page (Burns and Lutz, 2006). In order to deliver relative marketing information to proper audience, improvements such as displaying ads which match its context and showing ads along with search results have been made. Moreover, more and more websites have deployed tracking cookies for tracking behaviors of users anonymously (in most cases), in order to deliver ads which match users' best interests (Ghosh et al., 2015).

Desktop platforms provide visual impact through the big screen size. A larger size of ad may lead to better brand recall from audience (Chatterjee, 2008). It can display an ad that occupies half of the web page to draw attentions while users can still process the major content of the site. Additionally, as the sales of e-commerce are mainly depending on online advertising, desktops have higher commerce conversion rates than mobiles (AdWeek, 2014).

2.1. Mobile advertising

In 1993, text messaging was developed. Within 10 years, the first major SMS campaign was launched by Nike and Pontiac (Hsu, 2014). After a few years, SMS advertising was diminishing. It becomes various and more ways to make mobile marketing through the Internet (IAB, 2015), such as scanning a two-dimensional barcode code to access a website, checking in your location with Foursquare, browsing blog posts along with Google Ads and viewing friends' feeds on Facebook with sponsors advertising.

Comparing to desktop platforms, mobile advertising is delivering promotional marketing messages via a mobile channel to customers who are constantly connected using a personal mobile device (Kaplan, 2012). Due to the constant connection, ads can deliver their messages to customers any time. Moreover, as the high penetration rate of mobile devices, it shows more potential information for ad networks to track users' behavior. Mobile devices are personal and individually addressable (Bulander et al., 2005). The more personal data collected, through data analysis, the more accurate for targeting advertising. Notably, location awareness is one of the most significant advantages of mobile advertising. Ads can not only be sent base on cities where users locate, but also be deployed as accurate as available information within 10 meters range of users. It helps traditional retailers as bricks and mortar to promote themselves to potential customers who are approaching.

However, it also shows the challenges of mobile advertising (Bulander et al., 2005). As mobile phones are personal devices, users are more sensitive when it comes to spam and privacy concerns. Spams on mobile phones can be more disruptive than on emails since they interrupt users' current activities spontaneously. Moreover, the expense of data usages on mobile phones is more expensive than on cables. Ads especially which are in image or video forms cost users.

In general, there are a lot in common between desktop advertising and mobile advertising, such as advertising base on search, context and user behaviors.
Though mobile devices have smaller screens, they represent more accurate behavior patterns of users, especially for the location feature. However, the pricing models for desktop adverting and mobile advertising are basically aligned.

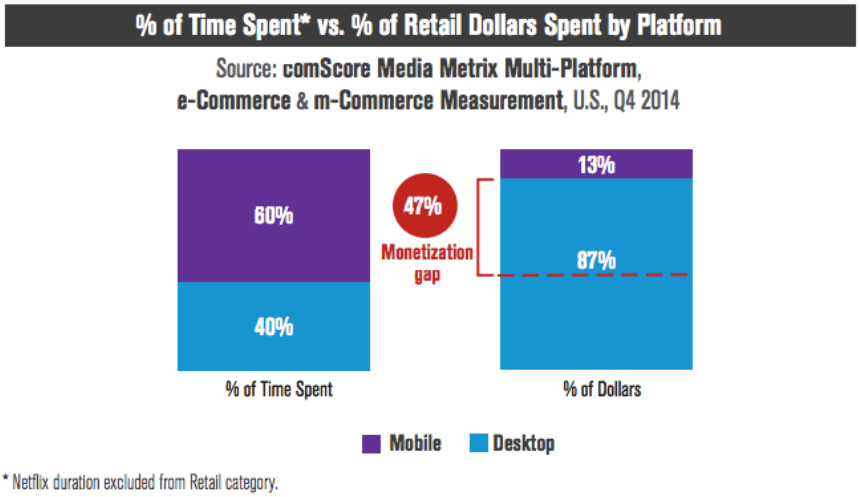

Figure 3 Time Spent vs. Retail Dollars Spent by Platform in U.S. (comScore, 2015)

Moreover, a report from comScore Inc. (2015) shows major revenue in e-commerce are from desktops. As shown in Figure 3, though users spend longer on mobile phone for shopping online, the result of higher sales conversion rates on desktop may influence advertisers in e-commerce business when they value the direct return on investment rather than brand awareness.

2.2. Mobile Game Advertising

Mobile game advertising is a form of advertising which uses mobile games to deliver marketing messages for promoting brands and products to players. As described in Figure 4, it is a combination of mobile advertising and game advertising under online advertising. However, researches of mobile game advertising are not as much as online advertising (Goldfarb, 2013; Drake, 2011), mobile advertising (Bulander et al., 2005; Drossos and Giaglis, 2005) and game advertising (Smith et al., 2014a; Smith et al., 2014b).

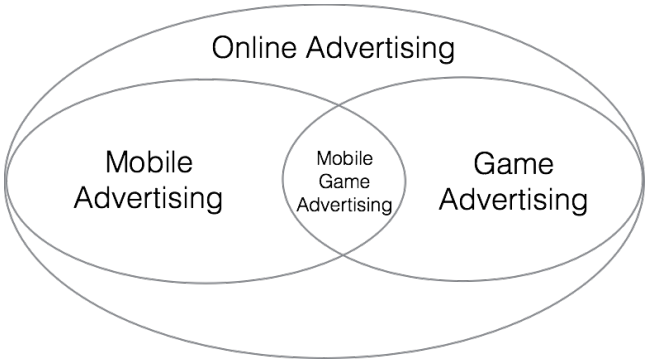

Figure 4 Relationships of Mobile Game Advertising

As social and mobile adoption has become significant for advertising and digital games in the past few years, emerging technology and adaptive ecosystem have kept evolving the concept of mobile game advertising. Base on the ubiquitous network and the

worldwide penetration of smart mobile device, mobile applications and games have much larger potential user base than ever. Advertising and in-game purchase allow mobile games to be sold in very low price or even for free, in order to capture more players. Meanwhile, the large amount of mobile game players attracts more interests of advertisers. Thus, mobile game advertising shows a circle consisting of mobile games, advertisers and players who share common interests. It is important to understand how to approach to advertising in mobile games to make this circle positive. Moreover, when game advertising goes mobile, it derives more options to launch different kinds of campaigns. For example, location-based feature is an advantage of mobile smart device, which can deliver the location related ad to targeted customers. Nevertheless, as the screen space of mobile device is limited, it is important to place ads without interrupting the game flow. However, the limited size of screens gets more engagement from players for advertisers.

US Mobile Phone Gamers and Penetration, 2013-2019

	2013	2014	2015	2016	2017	2018	2019
Mobile phone gamers (millions)	**129.3**	**147.6**	**164.9**	**180.4**	**192.2**	**202.8**	**209.5**
—% change	21.1%	14.2%	11.7%	9.4%	6.6%	5.5%	3.3%
—% of mobile phone users	52.3%	58.4%	63.9%	68.8%	72.3%	75.0%	76.5%
—% of population	40.9%	46.3%	51.3%	55.7%	58.9%	61.6%	63.1%

Note: mobile phone users of any age who play games on mobile phones at least once per month; excludes preinstalled games on feature phones
Source: eMarketer, Feb 2015

184791 www.eMarketer.com

Figure 5 US Mobile Phone Gamers and Penetration, 2013-2019, predicted (eMarketer, 2015)

A report of eMarketer in Figure 5 shows over half of the population in the US plays mobile games at least once per month, which is approximately 165 million people. Moreover, the time they spend on playing mobile games is increasing that 50% of the mobile game players in the US play 1-4 hours a week. Ads can be reached a large amount of potential customers through mobile game ad networks, which is more effective and expressive than ads on console games. For instances, Flappy Bird is a mobile indie casual game which has gone viral. It made roughly $50,000 per day with banner ads showing at the bottom of the game scene. In Figure 6, a report (Opera Mediaworks, 2015) shows that mobile game advertising generated fewer impressions but higher eCPM (effective cost per mille), which is a measurement shows the advertising revenue generated per 1,000 impressions. Furthermore, video ads in mobile game are dominating more than half amount of all ads shown.

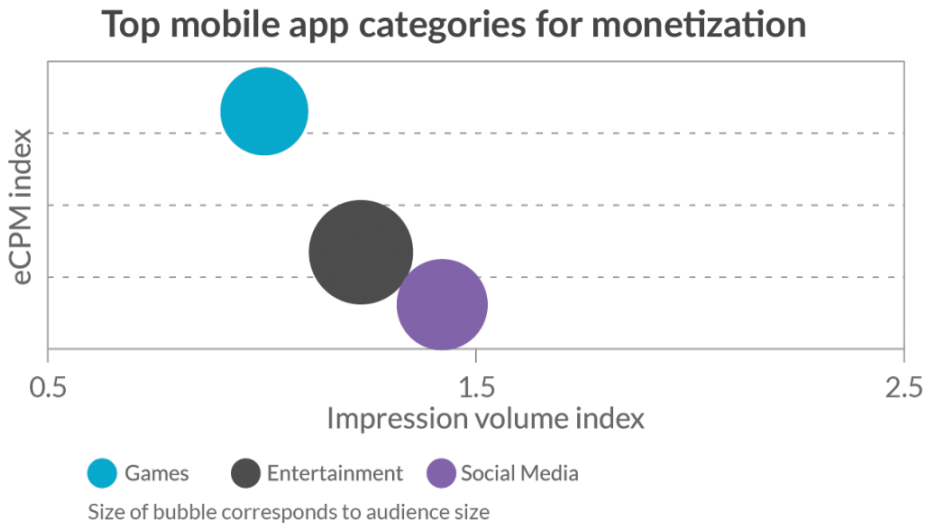

Figure 6 Top mobile app categories for monetization with Impression volume and eCPM index
(Opera Mediaworks, 2015)

It is crucial for an ad network to provide a high quality platform for game makers and advertisers. Tools such Software Development Kits(SDKs) or plugins should be available for game developers so that games are able to display ads. As mobile phone has limited performance and games are usually very performance-consuming, tools of ad networks which are integrated in mobile games must be stable enough and not preempting resources from the games. For advertisers, in order to increase the engagement rate of ads, ad networks should be capable to deliver ads to targeted potential customers.

3. Game Advertising

Mobile game accounts for roughly a third of the global games market, for instance the number of available games in the iTunes App Store is about 400,000 in 2015 (Statista, 2016a). Gaming has penetrated multiple generations across multiple device globally. Such a massive entertainment medium provides higher levels of engagement and brand influence.

Typically, a game has three main ways to monetize. Firstly, a player pays a game when he/she attempts to download or install it. Secondly, virtual assets such as currency and premium items can be bought with real money. Thirdly, ads displayed in games are paid by advertisers (IAB, 2014). Due to the trend of the Internet penetration and social media, some games tend to lower their price even become free-to-play(F2P) to widen the distribution and gain more players, which make in-game purchase and game advertising to play more important roles for game revenue (Paavilainen et al., 2013). Notably, as not all players are fond of spending real money on virtual games (Mäntymäki and Salo, 2015), game advertising forms an efficient way for game makers to monetize their games.

Similar to any other kind of advertising, game advertising has three major roles involved: advertisers, game makers as publishers and players as consumers. As the average age of game players are lower than Internet users, game advertising shows great potentials for advertisers to target younger generations (Statista, 2016b). Moreover, comparing with traditional web contents which are merely providing information, game contents are far more interactive. Game contents such as game stories and game plays require high involvement of players. It is possible for ads to be associated with these interactive contents in order to influence the players.

When an advertiser launches a game advertising campaign, the brands or products as advertiser's assets are promoted to players. They can be displayed directly in the game as images or videos, or be transformed into other forms of ads which carry the marketing information of advertiser's assets such as lines of copywriting. contents of ads represent what information are contained. Moreover, advertising placement represents where the ads are displayed. An ad can be placed along with a game or blended into a game with its game elements.

A game may consist of different kinds of game elements, such as currencies, environments, game stories, characters, items. When a player is playing a game, he/she has to interact with the game elements. Each game element is potential to become a placement for an ad. For instance, it can be a logo displayed on a game item, or a game story which is totally based on a brand of an advertiser.

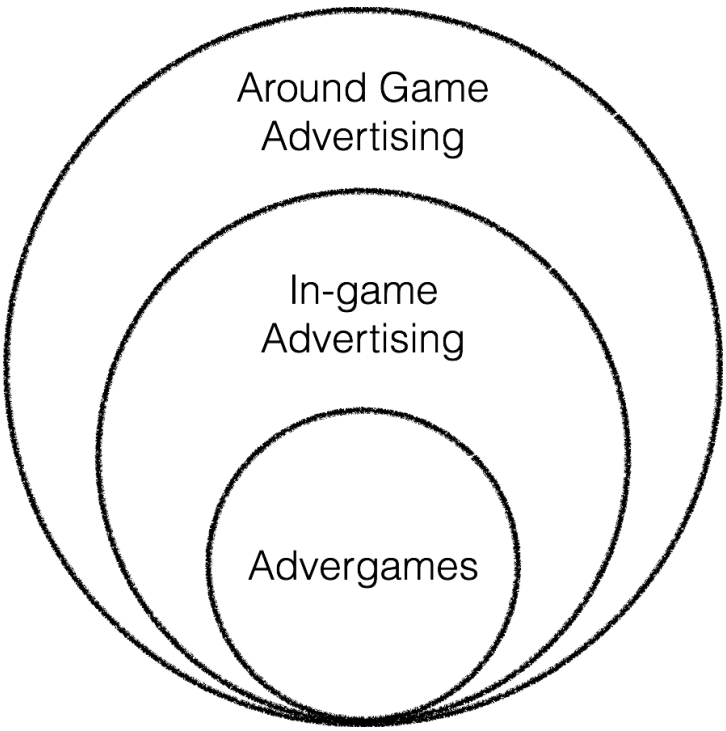

Figure 7 The Three Main Game Advertising Types (IAB, 2014)

Depending on different ways of how game and advertising cooperate with each other, different concepts such advergames, in-game advertising, and around game advertising have been derived, as shown in Figure 7.

3.1. Advergames

An Advergame is a digital game specifically designed around a given brand, service or product of advertisers. As a mixture between a game and advertising, the advergame leans to the advertising side and plans to target potential customers for advertisers. Thus, the game will serve the advertising purpose as higher priority. Marketing information is integrated directly into games so that the advergame creates a harmony game made of advertiser assets. The game elements which contain marketing information can influence players without interfering with their engagement. In other word, an advergame is designed as an ad first product.

The expected results of advertising are either enhancing brand awareness or increasing sales rates. If an advergame is designed for sustaining positive customer attitudes and remaining the brand exposure, it can be considered as ‘Experiential’ (Smith et al., 2014b). While users are interacting with an advergame, the game experience is influencing the marketing information towards users, which may lead to better customer

loyalty and mental association. Nevertheless, an advergame can also be a medium as 'direct response' to deliver promotional messages such as special discounts (Smith et al., 2014b). Such a direct response advergame is aimed for increasing revenue directly and indirectly. For example, special discounts can be used for rewarding players who achieve certain levels. Moreover, it is easier for brands with strong intellectual properties to generate revenue directly from advergames through in-game purchase[1].

There are pros and cons for launching an advergame campaign. Advergames may lose the overall game experience and story without the branding involved. When the brand and the game have a strong thematic connection, the attitude of players toward both the game and the brand are highly positive (Wise et al., 2008). As game creators and advertisers start their partnership, their reputations are bonded. An advergame with great quality and playability can not only attract plenty of players, but also raise brand awareness and sales for advertisers, and vice versa. Sometimes, if the advertisers are already well-known for most of the people, it may give a boost for increasing players for the game.

Usually, many advergames choose the quantity of distribution as higher priority so that the games are free to play. Though making an advergame seems to be a part of the cost from a campaign budget and usually not created for earning direct revenues, a successful advergame can be an ad and be monetized at the same time. For example, the cookie company named OREO extended their product virtually. They have created a successful mobile advergame named "OREO: Twist, Lick, Dunk", which received over a million downloads through Google Play Store (2016). In this game, users simulate actions in order to put cookies into a big glass of milk. Those simulated actions are the same as OREO's slogan: Twist, lick and dunk. It is rare that an advergame managed to gain a great success. A high quality advergame with great brand of advertiser can be benefit for both the advertiser and the game makers.

3.2. In-Game Advertising

In-game advertising is the integration of advertisers' assets within the game play environment of digital games. Comparing with advergames, it has a higher priority to focus on the game itself over advertising, but less involvement of advertising in games. An in-game advertising game can still be completely functional if all the marketing information in it are replaced or removed. Although it does not rely on the advertising placements, in-game advertising can be a reflection to real life marketing mechanisms to enhance the realism of game experience.

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1 International Games Developer Association. (2008). 2008-2009 Casual Games White Paper. [online] Available at: https://c.ymcdn.com/sites/www.igda.org/resource/collection/BCB11E9B-13E6-40D0-B390-952B5E11D35A/IGDA_Casual_Games_White_Paper_2008.pdf [Accessed 12 Apr. 2016].

A large quantity of games especially non-fiction games are built to simulate parts of real life, allowing players to experience different types of professions or roles in front of screens. In order to create a game environment reflected to the real world, advertising placements are a part of the important elements. For example, a good car racing game should provide a game environment that is simulated closely enough to an actual car racing scenario. As shown in Figure 8, in a real car racing, all of the cars are decorated with different brand names, so are the racing suits. Though ads are usually unwelcome even irritating, in certain situations such as digital car racing games, they might seem to be unreal without ads. They help to simulate the reality. However, in-game advertising turns marketing communications into an enhancement for a real life simulated game. A game simulates a real environment which has brands and ads surrounded already. The game reproduces these marketing information as options for advertisers to bid for changing the brands or products into theirs.

Figure 8 A car racing digital game simulating a real car racing scene

In essence, the placements of in-game advertising are textures or images of game elements. If a real life simulated game is designed without any actual ads involved, the placements can be filled with fake ads to maintain the realism.

In addition, the contents can either remain unchanged forever or be switched to others according to the agreements between game makers and advertisers. On one hand, static in-game advertising is a permanent advertising placement in a game before the game is published. It does not require Internet access to update the ads since the original contents are fixed. However, the static in-game advertising was invented because of the limited network bandwidth, now it is used more for long-term aesthetic scenes in games. On the other hand, as an ad placement might be flexible for different advertisers, the contents of the ads can be altered through the Internet. In dynamic in-game

advertising, a game can keep its options open for advertisers to bid for different time slots, instead of making every ad fixed in static in-game advertising.

3.3. Around-game Advertising

Around-game advertising refers to displaying ad as an image or a video etc., along with digital games in a non-intrusive way (Smith et al., 2014b). It does not interfere in game elements. It started with web-based games with ad units surrounding the game window (IAB, 2014). It includes banners and interstitials.

On one hand, banner ad is a typical and universal form of advertising which is able to fit in different environments (Manchanda et al., 2006). Banner ads can not only be shown around the game windows, but also be suspending at the bottom of the game scene (or other irrelevant positions). On the other hand, a game usually contains different scenes such as starting scenes, loading scenes, pause scenes and game scenes. Interstitials represents ads presented in scenes such as pause scenes, loading scenes or the transition between two scenes. As players require higher concentrations in the game scene, interstitials allow ads displayed in non-game scenes to reduce distractions of ads. For example, as shown in Figure 9, a mobile game named 'Angry Birds' is displaying ads as interstitials in its pause scene.

Figure 9 Interstitial, Angry Birds showed ads when the game is paused

Literally, around-game advertising makes an ad explicit and isolated from the game. When a game is necessary to preserve the originality and integrity of the game as premise to add ads, around-game advertising is a preferable option. Such a loose structure makes the contents of ads are not obligate to be related with the game.

Additionally, Smith et al. (2014b) considered licensing as a part of around-game advertising. Game makers can establish licensing agreements for their game brand with

third-party as an extra revenue source. However, this thesis mainly discusses all game advertising which occur inside the game environments. As the licensing may cause a game entity gets away from the gaming environment, it has been decided to remove licensing from the discussion.

3.4. Summary

In summary, game advertising is classified as around-game, in-game advertising, and advergames. Figure 10 presents a game advertising conceptual framework and it is adapted from the framework presented by Smith et al. (2014b).

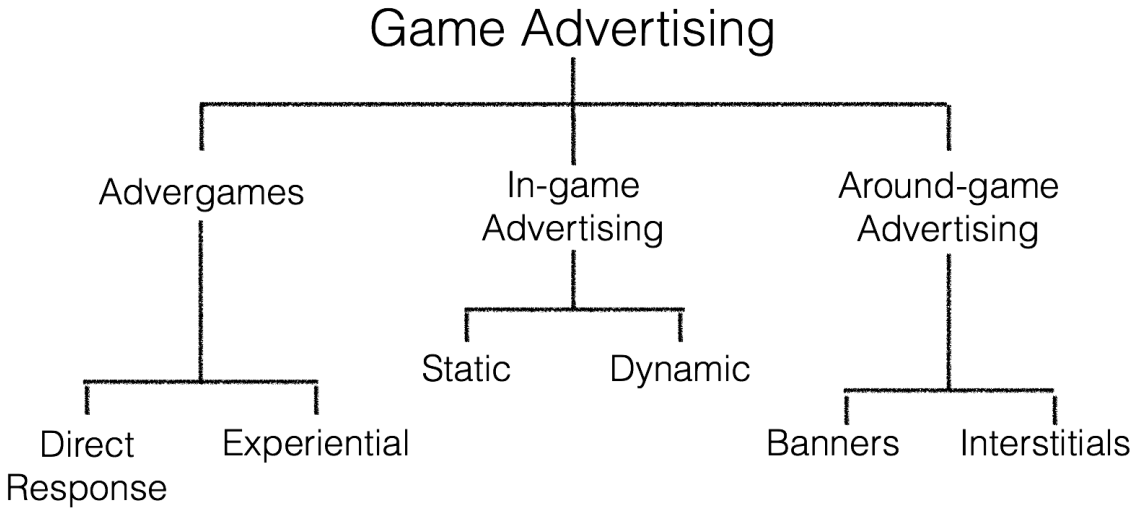

Figure 10 A Reformed Game Advertising Conceptual Framework adapted from Smith et al.'s research (2014b)

Ad placements of around-game advertising are independent of games. Banners and interstitials are hardly involved with game elements. They are displayed superficially with games. Whenever the contents of around-game advertising are removed or changed, the integrity of the game should remain the same.

For in-game advertising, the ads displayed in the game are associative or interactive simulations of real world media (Smith et al., 2014b). In-game ads are embedded into game environments such as passive background elements, sports apparel sponsors or posters, but the contents of ads are alterable. Ads can be replaced by applying new images, textures or 3D model from new contents of game updates.

In advergames, the game is market-oriented application for promoting brands or products of advertisers. Marketing information are integrated deeply into game elements. Usually game makers will receive payment from advertiser for game development, which alleviates the risk of launching new games to the unpredictable market.

Base on the ad placements in games and the depth of involvement of advertising, the author further presents the three types of game advertising in the coordinate, as shown in Figure 11. Around-game advertising consider game itself as the main priority with ads staying in the superficial level, while advergame s prioritizes advertising over games as marketing information penetrate into games deeply. In between, in-game advertising still weighs games over advertising, or stays neutral. However, cross promotion and sponsorship, which originally belong to around-game advertising in Smith et al.'s conceptual framework (2014b), describe the ways how game makers and advertisers cooperate with each other. The purpose of games and the involvement of advertising are varied broadly. They can blend ads into game elements as in-game advertising and advergames, or keep ads and games isolate with each other as around game advertising. Thus, they do not belong to any specific categories of game advertising.

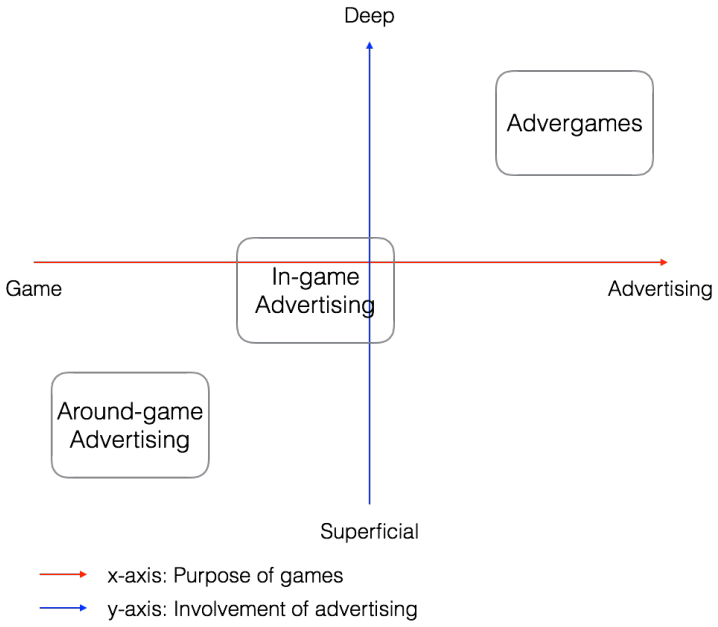

Figure 11 Demonstration of different categories of game advertising in coordinate

In conclusion, a reformed game advertising conceptual framework is presented. If a game meets with superficial advertising, it is consistent with the pricing models for most types of online advertising. When ads get deeper involved with games, advertisers are exchange values with game makers instead of merely paying for ad placements.

4. Advertising Performance

Advertising is a form of marketing activity used to promote a product or a service and to lead to sales eventually. It derives two major Internet advertising pricing models: Impression-based and Performance-based. Impression-based model calculates the cost of an advertising campaign base on impressions, such as CPM (Cost per thousand views). Performance-based model is a form of advertising that ties advertising payment to measurable results, according to certain performance metrics, such as CPA (Cost per action) and CPC (Cost per click). The CPA pricing model is the optimal model to measure the ROI (return on investments) of an advertising campaign which is designed to produce immediate purchases. However, advertising is beyond merely creating immediate sales. Advertising effectiveness measures the results of brand awareness and sales produced by the ads.

Moreover, as ads are along with contents or services of publishers, users consider the ads are a part of the whole experience on accessing the publishers' contents. Users expect a software is easy to use and simple to learn. Otherwise they will change to other more usable applications (Offutt, 2002). The same as games, a good playability, which is the instantiation of the general concept of usability in digital games, makes players enjoy playing the games (Fabricatore et al., 2002). However, the greedy pursuit of advertising effectiveness might compromise the usability of applications and playability of games, which may lead to bad user experience for users/players. Consequently, user experience should be an important part of ad performance. User experience was added to evaluate advertising performance, which is similar to advertising effectiveness originally addressed by Rohrer and Boyd (2004). Intrusiveness influences the user experience of advertising significantly. A positive user experience from ads can lead to a positive attitude towards brands and products and a long term positive memory recall (Chatterjee, 2008).

Therefore, effectiveness and intrusiveness are two major factors of advertising performance. Advertising effectiveness helps evaluating and improving ROI and brand awareness, while intrusiveness of advertising guides how to maintain the positive attitudes of users towards both the ads and publishers' services. By balancing between them, it is possible to maximize the advertising performance.

4.1. Advertising Effectiveness

Advertising effectiveness measures the results of branding and sales led by ads. Ads can lead to immediate purchase, engagements from users, and exposure of brands/products. With the help of online advertising technology, it makes online ads traceable and measurable. The performance-based pricing models such as CPA and CPC help

measuring the ROI, through calculating number of actions and click through rate (a measurement of audience response to online advertising) caused by the ads. The higher click-through rates represents the higher engagements acquired from users. For measuring exposure of brands and products to users, counting the number of ad display is a preferable option such as the CPM pricing models.

Impression-based models are unidirectional and not able to get attitudes or responses of users. Thus, in order to measure the effectiveness impression-based ads, previous research has analyzed how much brand recalls and positive attitudes from users, especially for banner advertising. Banner advertising shares a long history with online advertising. It is proven that banner advertising leads to increased brand awareness, purchase intention and site visits, especially when the ads are highly affinitive with the publishers' contents, such as games, websites and apps etc. (Manchanda et al., 2006). Although banner advertising has been kept improving such styles and animations, its declining average click-through rates still shows the ineffectiveness, even direct mail advertising acquires the average rate of response at about 1.5% to 2% (Hamborg et al., 2012; Sherman and Deighton, 2001).

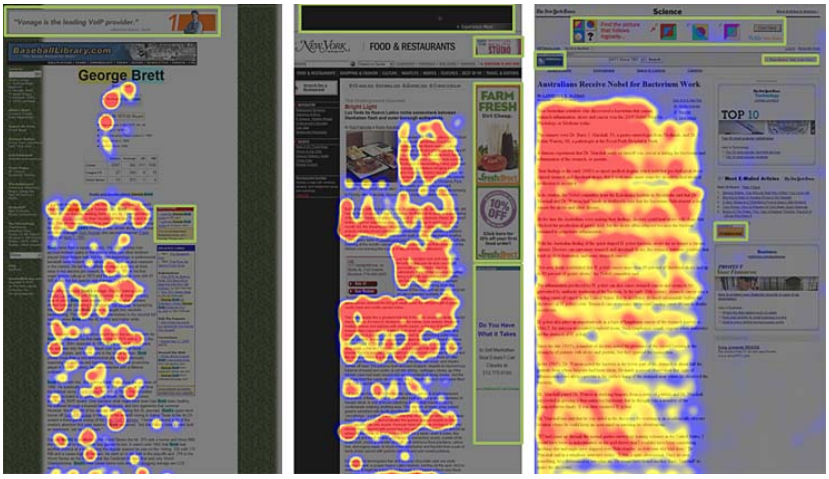

Figure 12 Heatmaps from eyetracking studies: banners didn't attract any fixations. Rectangle boxes were drawn on top of the image of ads (Nielsen, 2007)

Moreover, prior research has shown a phenomenon "Banner blindness", where visitors consciously or subconsciously avoid fixing their eyes on banner-like information. Nielsen and Pernice (2010) have made several experiments, which track users' eyes while they are viewing web pages containing banner advertising. The resluts show users almost had no fixations within ads. In Figure 12, it shows three different web pages consist of main contents and banners. Users did not pay attentions to the banners. It implies impression-based ads capture lower engagements from users. For game advertising, the banner blindness applies to banners and interstitials in around game advertising, as the ads are isolated from the main game contents. Although ads in in-game advertising is more interactive that draw more attentions from players, they are embedded in game elements which usually contain links direct to advertisers' websites

which makes click through rates are not able to be measured. Some forms of advertising appeared such as the large size rectangle ads placing between two paragraphs, the interstitial ads showing between two pages or game scenes, the skyscraper ads which usually are placed next to the scroll bar in tall and narrow shape, and rich media ads with animation, sound and video. All these variations of advertising are trying to achieve higher click through rates and brand recall.

Other than direct response or click-through rates, brand awareness is the other part of advertising effectiveness. The way to measure the influence of brand awareness is how users remember the brand information. Implicit memory and explicit memory, which represent different ways of remembering information, are complements for the measurements of online advertising effectiveness. Explicit memory is the conscious, intentional recollection of previous experiences and information, while implicit memory is an unconscious, unintentional form of memory (Yang et al., 2006). Regardless the existence of "Banner blindness", it has been proved that the exposure of advertising increases users' implicit memory and favorable attitude toward the advertised brand despite of the levels of attention are paid to the ads (Chan, 2008). In addition, longer exposure time and bigger size of banner ads have positive impacts on users' recognition and memory recall towards advertised brands (Goldstein et al., 2011; Chatterjee,2008). Specifically, banner ads in games can be more effective than in general. A research (Yeu et al., 2013) showed that banner ads in game lead to high implicit memory and partially high explicit memory, even though primary attention of players is focused on the game itself. Moreover, it also mentioned skilled gamers had a higher level of implicit memory than others who were not good at playing games. Since players are able to be influenced by marketing information in games, it suggested the advergame is a form of medium that can deliver marketing messages while reducing the tendency for advertising avoidance.

It is important to shift users' attention from the contents they are originally exploring to consciously process marketing information from ads, otherwise the effectiveness of the ads remain in a low level as users have tendency to avoid pay attention to ads. There are two major reasons why users tend to avoid fixation on ads: periphery brand placement and cognitive avoidance. When large ads and pop-up ads occupy more screen space, they yield the difficulty for users to cognitively avoid them. Specifically, pop-up ads (Wei and Wu, 2014) appear automatically and interrupt the users and force them to make decisions, either being forwarded to advertiser's asset or resuming their original process by clicking the close buttons of the ads. Drawing user's attention is the prerequisite for enhancing click explicit memory and response rates of advertising. Thus, using pop-up ad format and increase ad size have been common ways for advertisers to improve ad performance. A study (Chatterjee, 2008) has shown that the click through rates of pop-up ads, especially ads in large size outperform those ads in small size and in banner format. In addition, pop-up ads result in a significantly higher level of ad perception and higher purchase intention than banner ads.

As the natural interactiveness of games allows ads to have more options than mere banners to incorporate the marketing information into games, the placement of advertising is one influential factor for effectiveness in game advertising. The various types of advertising placements in games have different effects on brand recall. When an ad is included as a prominent part of the game play, the player showed significant recall levels on the brands (Nelson, 2002; Grigorovici and Constantin, 2004). Furthermore, if a brand is prominently integrated or simulated into a digital game as in-game advertising, the positive or negative attitudes from games will transfer toward the brand in real life.

Other factors associated with congruence and relevance between games and brands have been found to affect a player's brand memory recall and awareness. Due to the brand is less contextual relative within the game, moderately incongruent advertising leads to higher memory recall. Meanwhile, brands with high congruency towards the game make better attitudes and have a positive impact on both product interest and purchase intention from players. In the same way, brand placements may have less effectiveness in games which are fantasy or science fiction themes (Smith, Sun and Mackie, 2014), because brands from real world are usually too incongruent.

In addition, studies have shown that the genres, types and characteristics of game appear to influence recall levels. Notably, as they naturally have environments for brand placements such as billboards and sponsorships, sports and racing game are commonly used game genre in many researches (Smith et al., 2014b), which prove these game genres are good for brand memory recall. Recall are also higher for slow games and easy games, as such casual game experience do not require high perceptual loads from players (Herrewijn and Poels, 2013). Controversially, as the impact of brand recall levels can be caused by violent games, Jeong and Biocca (2012) found it positive while Yoo and Peña (2011) argued it is negative. However, all of them found that game violence leads to negative attitudes of players towards the brand.

Another factor that appears to influence the advertising effectiveness is collaborative gameplay, with online or offline partners resulting in high recall and attitudes to brands. On one hand, offline partners represent people with whom the player is playing multiplayer games within the same place. Friendly offline partners help to increase brand recall. Additionally, being as spectators who watch gameplay have higher brand recall instead of actual playing. On the other hand, online partners mean players interact with each other through social games. It has been found that social features improve the positive attitude towards games. As mentioned before, the attitudes from games can be transferred toward the advertised brands as long as the brands are highly integrated into the games, for example, advergames. Thus, social advergames may cause highly positive attitudes toward the brands due to the attitudes toward the games.

In summary, the player's attention towards ads, relevance between ads and games, and others such as game genre and collaborative gameplay are the influential factors on

advertising effectiveness. Interaction and intrusiveness can increase the attention of players towards ads. Meanwhile, higher congruence and relevance between ads and games lead to better advertising effectiveness. According to the reform game advertising conceptual framework, deeper involvements of advertising in games provides more interactive ads and higher attentions from players. Moreover, it also provide higher relevance between ads and games. Thus, for enhancing advertising effectiveness including sales, click through rates, and both explicit and implicit brand recalls, advergames are the strongest, then cross promoting and in-game advertising, while around-game advertising remains the least.

4.2. Intrusiveness and Non-intrusiveness

Intrusive advertising represents any variety of ads interferes with a customer's ongoing cognitive processes (Li et al., 2002). Although intrusive ads are pragmatic for advertising effectiveness, they compel users to divert their attention away from their original goals. It may lead to negative feelings and attitudes, such as being distracted, disturbed, interfered, intrusive, and obtrusive, toward the advertised contents and the publishers (e.g. websites and games) (Wei and Wu, 2014). Moreover, it may cause damage to the brand reputations, the credibility of publishers, and the share intentions of users.

Non-intrusiveness is one of the factors that effects user experience. To produce positive user experience for users, avoiding using intrusive ads are important. Ad blocking techniques are developed to help users removing annoying and intrusive ads for users from the services they are using. Though ad blocking has always been a controversial topic, a survey shows that some people who believe it may destroy online advertising industry while others argue it belongs to one of user's rights when accessing digital or online services (Ashish et al., 2009). Besides stopping intrusive ads, there are more reasons for the evolution of ad blocking techniques. Some online ads are deceptive that trick users into clicking them and redirect to different sites which are not supposed to. Additionally, as mobile devices are portable that people may take them along in anywhere, the delivery of mobile ads can easily intrude the users by sound or vibration. In general, the negative attitudes brought by online advertising not only damage the images of advertisers and publishers, but also encourage people to improve and use ad blocking techniques. People get annoyed from intrusive ads because they interrupt what people are doing on the main contents of publishers. Nevertheless, player's attitudes may be transfer to attitudes towards advertised brands. The negative attitudes brought by intrusive ads also might damage players' share intentions and reputations of games. However, if ads remain passive and displaying on the backgrounds as banners, advertising effectiveness is not proficient.

Explicit permission helps alleviating the irritation of users and improving acceptance of users towards ads (Barwise and Strong, 2002). It is a method that gives users options to

choose whether they would like to receive ads. In order to encourages users to actively watch ads, incentives are needed. For example, in around-game advertising, it can ask players for a permission to show a video ad. If they complete watching a whole video ad, in exchange for a virtual bonus is granted in the game. In this case, the ads capture players' attention while maintaining positive user experience for players.

Playability is also one of the key factors in the user experience, which is defined as the degree to which a player is able to learn, control, and understand a game (Pinelle et al, 2008). A game itself has its original playability. When the game is involved with advertising, its playability should not be affected negatively. According to heuristics for evaluating playability (HEP), the game interface should be as non-intrusive to the player as possible (Desurvire et al., 2004). Although shifting the attention of the player from the game to the ads might lead to high effectiveness, such intrusive behavior effects negatively on playability which is a part of user experience. Therefore, non-intrusive ads in game such as interstitial ads, product placement in game environments and background placement, are better than intrusive ads.

In addition, the HEP also addressed that the user interface should remain consistent in color, typography, and dialog design etc. Although banner ad is a part of non-intrusive ads, it contains different colors and designs that are very possibly not consistent with games, especially when the contents of banner ads have animation. Furthermore, banner ad occupies the limited screen space from mobile devices. Game makers should consider the placement of banner ads carefully. Moreover, studies illustrated that players may have more positive attitudes on mobile game advertising, if the games do not show ads to players unless they choose to give permission (Tsang et al., 2004).

Although user experience of game advertising is a complex subject, the factors mentioned above are narrowed down to non-intrusiveness and playability. Providing explicit permission from players and avoid using intrusive advertising are important factors to improve user experience. Furthermore, game advertising should not damage the original playability of a game. In fact, it is possible for game advertising to improve the playability of a game. Combining rewards and advertising is an effective way to improve user experience.

4.3. Game Reward and Game Advertising

Typically, win and loss are the foundation of a game. Puzzles or challenges are designed in a game for players, who try to achieve to win. However, making a game with great playability is not simple. Not every game is usable and playable enough to attract new players or keep the old players. The HEP indicates a game consists of game play, game story, game mechanics and game usability as four categories (Desurvire et al., 2004). In game play category, it illustrates that a game should give rewards to the players to improve and customize their game characters' ability. For example, though

wining itself can be considered as a reward, winning with prizes can stimulate greater gratification of players, such as level-up, power-up, coins and new equipment. In addition, the reward mechanism in digital games increase the incentives of players to persist at the games, even become additive. With proper rewards, it could build up positive attitudes of players toward the games. Moreover, Rewarding increases players' frequency of imitating the rewarded behaviors, which are effective in violent and educational games (Buckley and Anderson, 2006; Gentile and Anderson, 2003). Therefore, rewards in game can be considered as motivations. As long as the mechanism is properly designed, it helps boosting the playability of the games and improving attitudes of players.

Reward mechanism can be integrated with game advertising. On one hand, game advertising is one of the important source to get revenue. With better performance of game advertising, it helps game makers to keep improving and updating the games, while maintain attitudes of players in positive level. On the other hand, rewarding provides motivations as well as gratifications. With the help of rewarding, the game play and the brand images are reinforced, which might lead the players to purchase behaviors (Terlutter and Capella, 2013).

Moreover, the HEP indicated providing rewards, which can help the players to increase their capabilities, have positive effects for playability (Desurvire et al., 2004). Game elements such as currency and items can be considered as perfect rewards. As mentioned in Chapter 3, each game element can be an ad. There are two ways to distribute rewards to players with advertising involved. Firstly, the appearances of game elements as rewards contain marketing information of advertiser's assets. For example, a virtual gift box as a game reward is covered by the advertiser's logo or a line of the advertiser's slogan. Due to the share intentions, such positive experiences might lead to positive attitudes of players toward both the game and the ads. Secondly, a player receives rewards after watching ads. As watching ads is time consuming and usually irrelevant with the games, players do not have intentions to watch them on purpose. With rewards, they can become the incentives for players to watch ads. Although it is advised to display ads in non-intrusive ways, rewards with virtual items or currency can still be considered as compensations when the players are forced to watch the ads. Notably, players have sufficient incentives to accept advertising for F2P games. For example, when an advergame is clearly stated it is a free game and supported by advertisers before being downloaded, the player feels less irritating (Salo and Pedeliento, 2015).

As mentioned in section 4.1, 'banner blindness' makes banner ads much less effective. Especially for a mobile phone, banners occupy part of the game scene which the screen space is limited. Rewards can be provided as incentives for players to view and click the banners. With such incentives, showing advertising with permission can become much more effective, especially for video ads. A report from MediaBrix (2014) shows that in value exchange video advertising, which is receiving virtual bonus in game after

viewing ads, the average video completion rates and average engagement rates are over 85% on mobile and 98% on web. Moreover, using 'rescue' (e.g. extra lives) as motivation achieves higher engagement rates than using 'reward' (e.g. extra coins) which have already captured 73.6% engagement rates. However, 'rescue' comes with frustration of players as they might be stuck in the current level, while using 'reward' as incentive can achieve higher frequency of ad display with positive emotion of the players. A mobile game named "Crossy Road" is using 'reward' as motivation, which has also acquired massive downloads, managed to get 3 million dollars in revenue through a more comprehensive mobile game advertising method[2]. It gives options for viewing video ads from time to time. In exchange, players receive extra virtual coins after the video ads are completed. With these coins, players can unlock new characters in game. Unlike advertising on desktops or websites, the video ad on mobile phone occupies the whole screen to display for averagely 15 seconds while playing. It is one of the most acceptable methods in mobile game advertising

Rewarding with game adverting does not have to stay in a virtual game environment. It can be extended as tangible incentives. Players can use their point achieved in the game as coupon to redeem physical rewards in the nearby local shops. A research has proven that this location-based tangible reward is effective and positively affect player' attitudes, especially for players on mobile games (Dickinger and Kleijnen, 2008).

In summary, reward mechanism in game is important and positive. With proper use of rewarding, it can influence players' behaviors and their persistence of playing, even let players become addictive. Reward mechanism can be shifted to game advertising, providing extra bonus as incentives for players to view advertising voluntarily. Moreover, the mechanism can go beyond games from virtual to real using mobile couponing. Virtual assets in game can be a currency as value exchange, from spending time on view video ads and for converting to coupons or discounts in brick-and-mortar. The in-game purchase allows players to use real money in exchange for virtual assets in games. But in other words, virtual assets in games have values and are meaningful for players. It is possible to use virtual assets as incentives to encourage players to visit and make purchase behaviors in local stores.

4.4. Other

As a mobile phone is a distinctive personal device, its characteristics such as ubiquity, localization and personalization represent more behavioral variables of a user so that ad networks can improve their targeted advertising if they manage to acquire such data from the user. A research (Salo and Pedeliento, 2015) shows that targeting customers by

2 Takahashi, D. (2015). Crossy Road earns $3M in revenue from Unity's video ads. [online] VentureBeat. Available at: http://venturebeat.com/2015/03/03/crossy-road-earns-3m-in-revenue-from-unitys-video-ads/ [Accessed 12 Apr. 2016].

group, time and location can increase the informativeness of ads, which can have a positive effect on the user attitude. For example, a group of younger people in EU were positively to receive marketing information such as special discounts or special events in local nightclubs.

Nevertheless, Location-based mobile advertising is an emerging form of mobile advertising that is becoming widely used in apps and games. When targeted users receive location-based mobile ads with relevant information at proper time and places, they have stronger purchase intentions and more positive attitudes (Lin et al., 2016). For example, mobile applications with location-based ads are effective in shopping malls, as users can receive discount information of shops are nearby. Scientific research proved that the closer time and distance of the content, the more concrete mental construals of the contextual details are formed in users' heads, which result in higher involvement experience that may lead to purchase behaviors (Luo et al., 2014). Location-based mobile advertising is an emerging form of mobile advertising that is becoming widely used in apps and games.

However, although most of ad networks claim that they are collecting and tracking user behaviors and locations anonymously, privacy concerns are still relevant issues for mobile advertising. Privacy concerns are all about insecurities of personal information data are used for unexpected purposes without permission and authorization (Cleff, 2010). Moreover, privacy concerns lower the level of acceptance and use of mobile advertising, especially personal location information are involved (Lin et al., 2016). Permission control on privacy such as requiring acceptance of term of use and privacy policy improves user attitudes. Moreover, MMA (2008) presented privacy principles for mobile advertising, such as providing users with notice, permission control and be responsible for the security.

5. Merging Real and Virtual Worlds

5.1. Reality-Virtuality(RV) Continuum

Ever since the technology of computer graphics and interaction has been rapidly developed, the boundary between reality and virtuality is getting blur. Through the emerging technologies, computers can generate virtual simulation in real time and display them alone or with the real world as background. Moreover, a virtual environment created by computers can be comprehensive enough to convince users to believe the environment is real. A world as a virtual environment can be an exact simulation of real world, or a fictional environment applying with a totally different mechanism, such as new creature, new time system, new space, and new physical laws etc. Such a world may not only be totally created virtually, but also be mixed with some elements added from reality. As real and virtual environments are not disjointed any more, they formed "Reality-Virtuality Continuum" (Milgram et al., 1995).

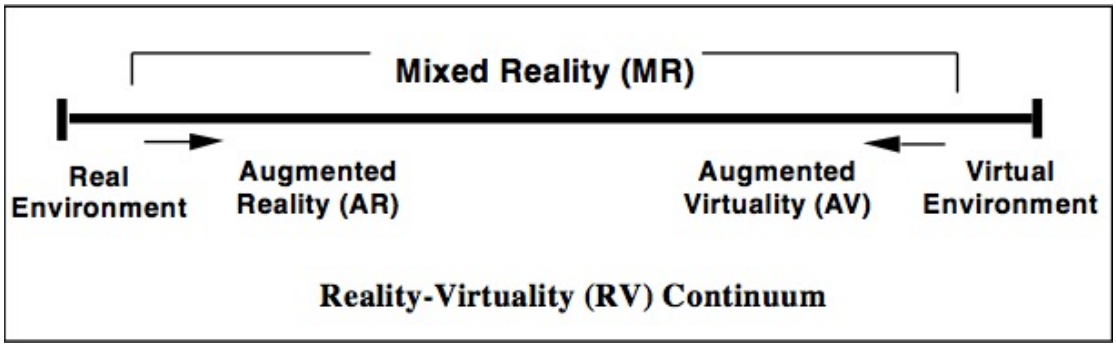

Figure 13 Simplified representation of a RV Continuum (Milgram et al., 1995)

As illustrated in Figure 13, the very left side of the continuum which a real environment locates, defines environments consisting exclusively of real and tangible objects. In a real environment, people observe directly from real scene or via a kind of electronic display system which displays the real time content in the real world. The right extrema of the continuum represents an environment consisting exclusively of virtual objects. It includes a conventional computer graphic simulation, named a virtual environment. It is a computer generated display that allows or compels a user to have a sense of being in an environment other than the one they are actually in, and to interact with that environment (Schroeder 1996: 25). Objects in a virtual world require a medium for displaying such as a screen, projection, or hologram. If an immersive virtual environment is created so natural that the user, who is in the environment as first person view, doesn't require extra cognitive leap to think of the virtual world as a real place, we call it Virtual reality (VR). An ideal VR environment provides the feeling of being physically present in the environment, successfully convincing its user that everything the user sees are truly existed. People experience the real world through senses of sight,

smell, taste, touch, and hearing, especially sight and hearing (Zamora, 2016). Sight has perhaps been the main focus of VR development so far, as advances in computer photorealistic graphics have led to persuasively real products. Simulation of binaural audio is able to trick the listener is put in a specific scene. Thus, improving a higher level of sensory fidelity is one of the key ways to create an ideal VR environment. Sensuously, dreaming can be considered as the most immersive VR that is not generated by computer graphics but imagination. It makes the dreamer to believe that it is a real scene, while he/she is actually lying in bed. This is what VR is trying to achieve, providing a total immersive feeling of "being there" when the user is actually "being here". The immersion and the sense of presence provided by the VR bring benefits for users. A research shows that applying VR can enhance the spatial understanding, strengthen the interaction task performance and reduce information clutter for users (Bowman and McMahan, 2007).

Mixed reality(MR) is the section between both extrema of the RV Continuum, where objects from real world and virtual world are shown together in a single display (Abu Shanab et al., 2012). It includes Augmented Reality(AR) and Augmented Virtuality(AV). Depending on how much elements from real world and virtual world are involved, we can define them the main role and the supporting role in a mixed situation.

AR is based on live video or the user's environment in real time, and blends digital information into it. In AR, a real environment plays the main role as a background, while digital elements are added. AR enriches the contents and experience from reality. Extra layers which contain digital elements are shown on top of the real environment. These layers and the real environment are displayed in the same screen. While capturing videos from the camera, AR technology analyzes the content and displays information on top of the original videos at the same time. It gives the user an extra layer to show relative digital contents. As processors and sensors are getting smaller and faster, a head-mounted portal virtual display can create AR environment, such as Google Glass from Google and Hologram from Microsoft. The display in AR is transparent so that user can see a clear view of the world. Though with virtual environment involved, users still can distinguish whether the item they see is real or virtual. For example, when people want to purchase new furniture, they can only use imagination to think whether the furniture fits the whole atmosphere, until they actually get it home. With AR, they can download the 3D model of the furniture and merge the content with their house. Through the screen, they feel like they already have this furniture.

On the other half of the continuum, AV represents that some objects from reality are added into a completely graphic display virtual environment. Such an environment can be completely immersive, partially immersive, or just in a small screen on a mobile phone. When a real object is being transformed into a virtual environment, it turns into a texture, a 3D model or something matches the context between both environments. In 2010, A mobile game company Zynga cooperated with 7-Eleven store to launch a

campaign[3] in US and Canada. Each specific brand item contained redeemable code for in-game item. For example, a redeem code from a pack of triple-color ice-cream, user can claim a special virtual cow with three colors in Farmville (Zynga's farm theme mobile game). Moreover, an AV environment allows real objects to interact with the virtual environment, such as a user's hand which can grab or point out specific items in a virtual scene, or a storyteller from the real world is integrated into a virtual scenario to visualize the story scenes (Kaneko et al., 1993; Cavazza et al., 2003).

Ever since both objects from real world and virtual world are able to blend in together in various forms, the RV continuum shows as a taxonomy of MR. AR providing user an extra layer to acquire more information from real objects shows a huge potential in traditional industrial, especially in the field of Internet of Things (Schwald and de Laval, 2003; Swan, 2012). In contract, most research in AV focus on user experience and game industrial. By bringing more real objects to enrich virtual environments, that is what AV is doing as primary purpose.

5.2. Merge Real and Virtual Worlds with Advertising in Local Stores

The technology of MR, including AR, AV and VR haven't been actually become widely accepted by a massive user base. They are new technologies to merge virtual and real environments together. Though it is just a beginning for MR to become widely accepted, many researchers have researched and made questionnaires to investigate users' opinions towards these kind of technologies.

Wang and Chen (2010) set up an experiment where participants worked on several usability tasks in an MR environment for design and then answered a set of questionnaires. The questionnaires consist of different kinds of structure such as sense, recognition, consistency, environment reflection and distraction. The result shows the participants gained a better sense from the MR environment. Furthermore, they found the environment was natural and helpful to use. However, the 3D models were suggested to be improved to enhance the feeling of realism and fulfill the complexity of the environment.

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3 Gilbert, B. (2010). Zynga and 7-Eleven partner to bring game content to ice cream, Big Gulps. [online] Engadget. Available at: http://www.engadget.com/2010/05/24/zynga-and-7-eleven-partner-to-bring-game-content-to-ice-cream-b/ [Accessed 5 Apr. 2016].

Figure 14 Scanning a birdcode though “Angry Birds Action!” game (Rovio, 2016)

When it comes to mobile MR, people expect experience such as creativity, inspiration, liveliness, playfulness, increased awareness and knowledge (Olsson et al., 2011). For example, a mobile game named “Angry Birds Action!” launched a campaign using MR with McDonald’s (Rovio, 2016). As shown in Figure 14, when a player scans a birdcode (a kind of barcodes) through the game, the player gets a virtual reward in the game. A reward can be a 3D sticker for decorating with a selfie or an enhancement for the capability of a game character. The collected stickers can be used for decorating. Birdcodes can be found on some of the McDonald’s packaging. In this example, the “Angry Birds Action!” game (as a publisher) is using virtual rewards to motivate players to visit and purchase foods in McDonald’s (as an advertiser). Through scanning a birdcode, a package of food in the real world and a game reward in the virtual world are mixed together.

For another example, Yelp is an mobile application which publishes crowd-sourced reviews about local businesses[4]. Users can review and rate the services of local businesses such as shops, bars, restaurants and night clubs. It can display local restaurants nearby according to the location of users. Typically, it points out the information on a map from an aerial perspective. However, it has an AR feature which displays the information of nearby local businesses from the user’s perspective (Parr, 2009). As shown in Figure 15, it actives the camera and shows the restaurants on top of the camera video base on the direction of where the phone is facing. It provides an intuitive and playful experience for users to locate their destinations, and does do advertising for local restaurants and stores.

4 Yelp is an American corporation, which developed the mobile application called Yelp. (2016). *Yelp*. [online] Available at: http://www.yelp.com [Accessed 1 Jun. 2016].

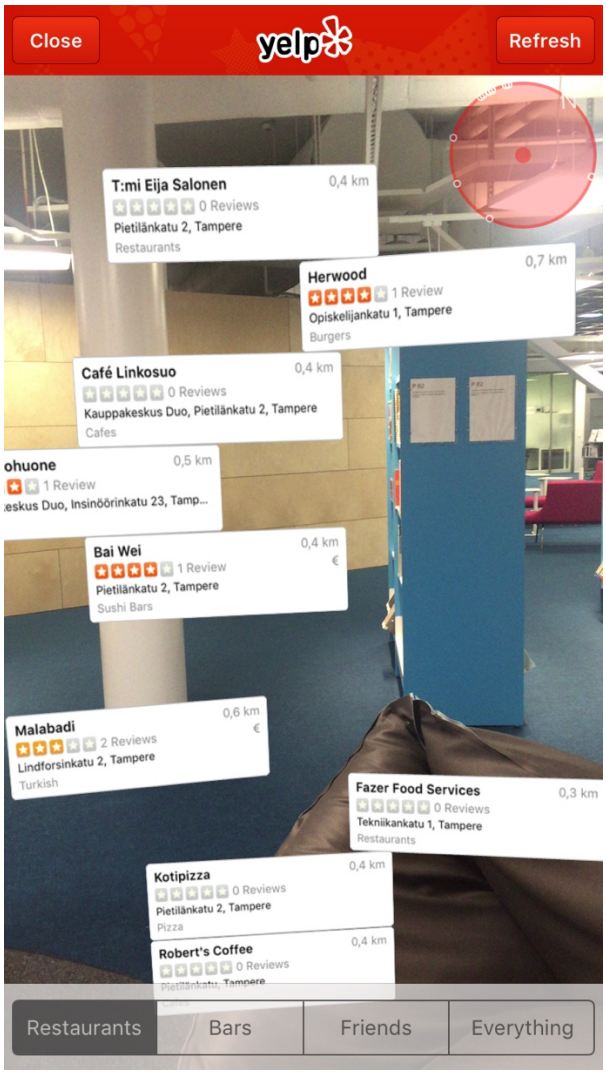


Figure 15 a screenshot of the AR feature of Yelp to display nearby resetaurants

However, using MR technology is not the only way to merge real and virtual worlds. Mobile couponing is fueling with the growth of mobile advertising. It is an import marketing strategy. Coupon is friendly for retails, because its result is measurable, either in paper or digital form. Through mobile couponing, messages can be delivered base on time and receivers' locations. Moreover, it can track whether a certain published coupon is used or not so that it implies to improve the targeting strategy. However, customers might have concerns about spamming and privacy issues, as mobile phone is a very personal device. Thus, providing permission of control for receiving coupons are important for customers' attitudes. For retailers, a research shows acceptance of users for receiving mobile coupons of local stores (Leppaniemi and Karjaluoto, 2005). Compared with paper couponing, mobile couponing reduces retailers' budget on printing and can achieve higher return on investment (ROI). Nevertheless, mobile couponing has to be used tactically. It is wise to offer coupons on items which are unique so that the retails can avoid competing other local store nearby (Shankar et al., 2010). Otherwise, vicious competition could happen as all competitors are trying to bid the lowest price to acquire customers.

Mobile couponing is a digital form of couponing. Such coupons can be delivered through SMS or the Internet. Customers can receive specific discounts or benefits by showing the coupons to the staff of stores. A mobile coupon usually has its unique serial number for tracking. When a coupon is redeemed, it is possible for the store to log the information of the transaction to establish specific profile for the customer. With these profiles, the store can distribute more accurate coupons to targeted customers in order to increase the efficiency of the mobile couponing. Mobile coupons can be received not only in a phone message box, but also in a mobile application. The mobile application can be either an application merely designed for receiving coupons, or an application for other purposes which has a function to receive coupons. Mobile couponing also provides an option for mobile applications to merge their own virtual information and environments with the real worlds.

6. Merging Tangible Items and Mobile Games Using QR Codes

Following the description in Chapter 5, there are many different kinds of techniques to be used as a means of merging the real and virtual worlds, such as QR codes, Bluetooth and cameras. Considering a method that is universal for smart phones and does not require extra hardware installation, the QR code is one of the optimal choices. QR codes have already been used in many applications that merge between real and virtual world, such as locating the position of a target quickly and AR applications (Nikolaos and Kiyoshi, 2010; Kan et al., 2009). In the following sections, it describes what QR code is, how to merge tangible items and mobile games, and a case of rewarding using QR codes.

6.1. QR codes

QR code is a type of black and white, two-dimensional barcode invented by Denso Wave in 1994 (Furht, 2011). The initial purpose was for automotive industry to track vehicles during manufacture, but now QR code has become one of the most widely used types of two-dimensional barcode for diverse scenarios. It is often applied as an indicator for MR applications to capture information from reality.

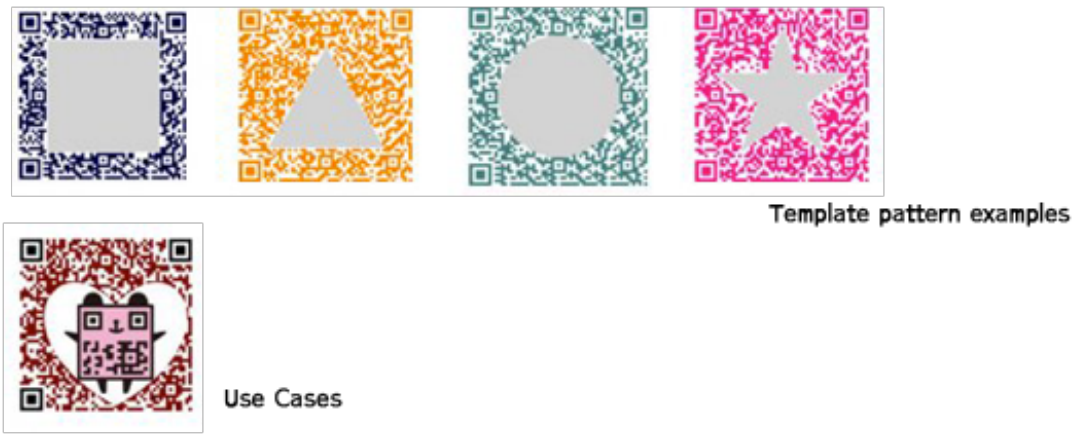


Figure 16 Frame QR code with desgins in the centre (QRcode, 2016)

QR code is able to carry high capacity encoding of data in a small printout size. It is readable omnidirectionally at high speed. It can contain various information such as plain text, email, vCard, Wi-Fi Access, and URLs. Since a QR code is monochrome, it

can be shown on most kinds of displayable surfaces, including tickets, receipts, and phone screens.

Moreover, QR code has an error correction feature which has four selectable levels of redundancy (Wakahara and Yamamoto, 2011). Even if the code is partially covered or wounded, it is still possible to restore and read the data. It also gives us a chance to make this antiquated black and white pixels a better looking, by placing an image or logo on it. For example, in Figure 16, modifications such as graphics and colors can be made for these QR codes to enhance the aesthetic appearance. However, QR code cannot be modified more than 30% of its redundant region. On three corners of a QR code, they are square blocks that the reader uses to identify and then align the code. The rest parts of space are stored with data and redundancy. As the redundant space is reserve for damage tolerance, too many modifications on a QR code reduce its redundancy, which may cause less readability when it comes to decode.

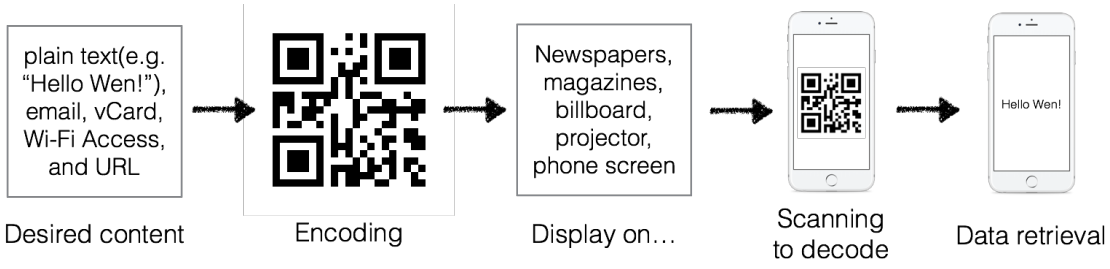


Figure 17 How QR code works

As shown in Figure 17, the mechanism of QR code as transferring contents is similar to More Code in telegrams: encoding the desired content as a code, decoding the code, and retrieving the original desired content. QR code can encode many types of actionable text. For example, when text representing an email address is recognized, it could trigger a prompt to write an email page in an email client application with recipient written. However, this only works when readers know that the text encodes with email information. By applying a standard URI (Uniform Resource Identifier) scheme or protocol, the QR reader on a smart phone will trigger associated actions. The open-source multi-format 1D/2D barcode image processing project ZXing summarizes the following standard URI schemes by adding specific prefix, such as URL (URLTO:), e-mail Address (mailto:), and telephone numbers (tel:). All the URI schemes and protocols mentioned are processed on the application-level (ZXing, 2016).

With the fast pace of the mobile Internet revolution, a QR code has become an effective portal to access digital information from offline media. Any smart phone with a camera has a QR code decoder application which helps to gain the contents by scanning the code. For example, instead of searching a game in App Store, a user can just download the game by simply scanning the QR code placed on a game poster. In online advertising, advertisers promote their products and websites through ad networks such as Google AdSense (Google, 2016). In order to reach a larger group of people from the offline environment, advertisers primarily use QR code to link printed media with

online media, which are usually URLs directed to websites, online stores, or Facebook Pages. In addition to commercial purposes, QR codes are applied to show geographic information placed in tourism areas such as forests, caves, and national parks etc.

As long as decoders can understand the prefix, an action will be triggered. With a customized QR decoder application, we can even design our own format for various intentions which beyond the standards. In an AR system, QR code is usually considered as an indicator for the system to display a virtual item on the screen (Kan et al., 2009). Since the QR code is easy to recognize, combined with gyroscope calculation, the AR system can still show the virtual item properly even though the camera keeps rotating and relocating. By building on contained geographical information, QR code can also be a calibration method for an AR system for high accuracy of coordinates.

A dynamic QR code refers to QR code that shows on a screen and which will get updated regularly in a short time from the server. It simulates the concept of session timeout originated from web development. This kind of QR code is encoded with real time information, and expires in a very short time. The dynamic QR code has become a method for scan to pay with mobile payment. Online payment companies such as PayPal, AliPay, and WePay (as third party online payment providers) are applying QR code to money transfer and purchase behaviors. Through the QR codes being scanned by merchants' devices, customers can pay for goods merely with these online payment applications. Dynamic QR code is suitable for logging into an online account as well. If a user has a mobile device with the account logged in, he/she can authorize other devices to access the same account by scanning the dynamic QR codes through the mobile device. However, if someone visits the website and downloads the QR code for authorizing, then phishes other users to scan it with their logged in device, it would be great security disaster. Thus, dynamic QR code has to be applied. If a QR code for authorizing has been shown for more than a minute, another one should be generated to replace it. Compared to a static one, a dynamic QR code system is more complicated and more secure.

In addition, work have been done on using QR code for item tracking in warehousing and logistics, product traceability in manufacturing, patient identification in healthcare, boarding passes in transportation, and coupons in marketing and advertising. In these scenarios, the information in the QR code does not have to be changed. Static QR code can be printed out on paper or displayed on phone screen as photo. In essence, the interaction of scanning QR code on a piece of paper is equivalent to tapping a button on a touchscreen. In other word, QR code brings a digital button to the tangible world.

As shown above, QR code has many benefits. These can be summarized in four points. Firstly, since most of smart phones can decode by default and numerous applications have a decoder feature, the message can be delivered anywhere to a person with a smart phone. Secondly, QR code makes things easier to move from mass media or printed media marketing to the Internet, so that it increases the effectiveness of a campaign and

integrates online and offline media. Thirdly, QR codes can count when and how many times the codes have been scanned. By adding a traceable URL and analyzing statistics data, advertisers and marketing department can understand if the a QR code campaign is successful. Finally, once a QR code can successfully direct a customer to advertiser's online promoting page, it saves a lot of the cost of continuously reprinting promotional or sales material. From a real world environment to a virtual world environment, QR code becomes a bridge connecting both sides.

6.2. An Example of Game Rewarding using QR Codes

A museum mobile game performed a preliminary field test in the Norsk Telemuseum received satisfactory results using rewarding with MR (Ceipidor et al., 2009). The game is a museum treasure hunt game for children using QR codes. At the beginning, the children as players receive a riddle related to knowledge of one of the exhibits in the museum. Next to each exhibit, is a QR code containing a description and URI for the game. Instead of replying to the riddle with answers directly, a player has to walk to a specific exhibition and scan its QR code. If the scanned QR code matches the riddle, it shows more description of the answer and the next riddle. In the end, whoever solves all the riddles will receive prizes from the museum.

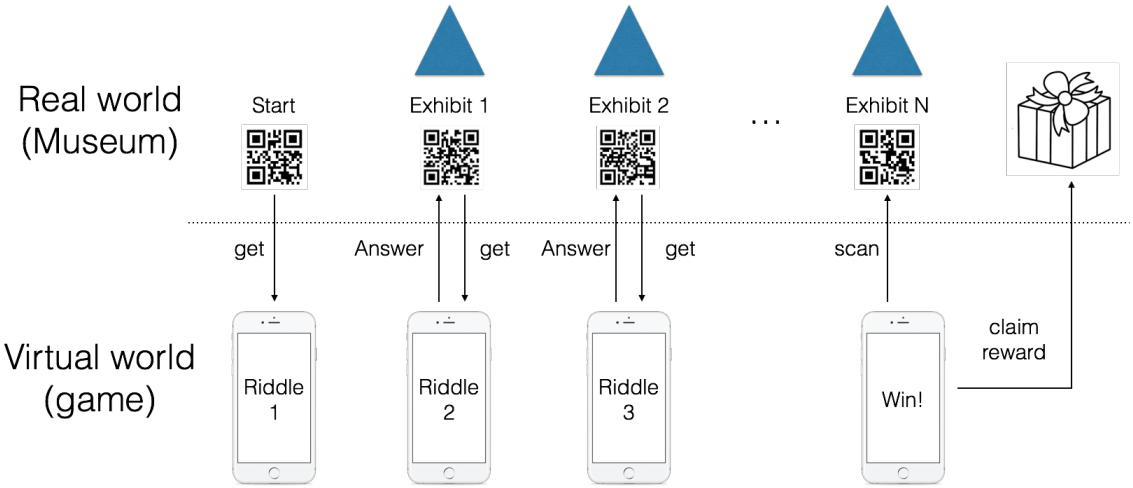


Figure 18 How the museum game uses QR codes to interact between the real and virtual worlds

In this example, if players want to win more prizes, they have to try their best to answer the riddles and scan the correct QR code of exhibits as many as possible. As shown in Figure 18, the game gets and answer a riddle of a certain exhibit through QR codes. The player does not have to type in the name of the exhibit. The QR code provides a smooth and fast way for players to interact with the game and the exhibit. A series behavior of scanning a QR code from the museum and then acquiring a riddle in the game provides an experience of MR. If the player does not the answer of the riddle, he/she has to read the description of the exhibit. At the same time, the player is learning more knowledge actively in the museum. When a riddle is solved, the game keeps the record so that the

staff of the museum can give prizes base on it. Although Ceipidor et al.'s research (2009) did not specify what the prizes were, the prizes are related with the museum or the exhibits, they produce a deeper experience through merging the real and virtual worlds. Such an experience provides creativity, inspiration, liveliness, playfulness, increased awareness and knowledge, which matches the expected experience of players (Olsson et al., 2011).

7. Using QR codes to implement a Mobile Game Advertising solution

Following the example in section 6.2, what if after scanning the QR code for an exhibit, the player gets the exhibit in the game as a virtual 3D item? For instance, imagine a player who acts as a museum manager and wants to get more collections to expand in a mobile game. Then one day, he/she gets a special task in the game which requires visiting the Louvre on site to collect the Mona Lisa painting. As soon as he/she has scanned the QR code next to the Mona Lisa, the Mona Lisa will be actually acquired in the museum of your digital game. Moreover, though a museum is usually a non-profit organization, such a mobile game with MR and rewarding can be used for the purpose of marketing and advertising purposes.

7.1. Description

This thesis proposes a mobile game advertising solution involved with local shops, and the real and virtual worlds. In this situation, local shops as advertisers, games as publishers, and players as customers are binding together. As Figure 19 described, games provide special tasks for players to purchase certain items on site from the advertiser's local shops. Once the purchase is confirmed, the players will receive virtual assets as rewards in the game, while the game makers collect money from the budget from the advertisers. Such transactions only happened after purchase behavior is done. Thus its pricing model is similar to CPA and belongs to performance-based model. The 'action' in CPA here refers to an offline purchase behavior lead by the game ad.

Figure 19 Relationships between local shops and games in the proposed mobile advertising solution

A game task is an activity that needs to be done to achieve a goal in a game. Usually, a virtual reward comes along after a game task has been done. A well-designed game is able to encourage players to complete tasks with proper rewards as incentives. Typically, a game task can be done inside the game itself, but it starts to go beyond it. For example, watching a video ad is an optional game task. It is the player's freedom to decide whether to watch it. If the video ad is watched, the player will receive a reward as a game task done. A report which has over 2000 developers and players surveyed shows 46% of players prefer viewing rewarded video content over any other ad offering, such as banners or interstitials without rewarding [Unity, 2016]. With game rewards as incentives, it is possible to turn a game task into a real task.

The proposed advertising solution can be used in any kind of mobile games, as long as it has game assets in exchange to become rewards. Generally, game assets as rewards include game currency and every game element which can be purchased with the currency. Moreover, they can be exclusive game elements as well, which can only be acquired through having certain game tasks done by the player.

7.1.1. How to connect local stores and games

The solution uses the optimal non-intrusive game advertising method with permission of players. A game receives ads as tasks from the server of an ad network. It is optional for the player to open them. Instead of watch video ads, the player is requested to visit a certain local store and complete a certain purchase. In return, the player receives a promised reward in the game. It helps attracting customers and increasing the sales for the local store.

However, currently ad serving technologies are only suitable for online adverting. If the purchase behaviors happen in an offline environment with cashes or credit cards, neither the game nor the ad network knows whether the transactions are occurred. It is important to develop a new method for proving whether an offline 'action' is valid. On one hand, for games and players, the method should be able to prove whether a player has done the required task so that the game can deliver rewards to the player' game account. On the other hand, local shops are not willing to pay the game makers until these offline actions are verified as lead by the game ads. The proposed mobile game advertising solution applies the QR code as the method to verify offline transactions caused by the advertising campaign between local shops and games.

The solution can utilize the QR code in two different ways. In the first method named 'QR on receipt', a QR code that contains information of the sale of goods or provision of a service is printed within a receipt. After a QR code is scanned by the game, the decoded data is transmitted to the server for verifying. Once the data is confirmed as a valid purchase, the game will receive a promised reward. Players contribute all the manual efforts to redeem rewards without staff of local shops involved. Although the

‘QR code on receipt’ is convenient, it requires both software and hardware update as preconditions. All cash registers of retailers should be able to print the expected QR codes. Moreover, they should be able to access the Internet in order to synchronize with the servers of the ad network for security reasons, otherwise forge receipts may exist. To meet all these criteria mentioned above, retailers might need to upgrade their registers as most of them are too old to be compatible. Once the qualified cash registers are set, the retailers are ready to deploy their ads as tasks for players on games.

The second method named ‘QR inspector’ involves with the staff of local shops. A standalone application can be developed for local shops to verify the purchase behaviors of players. Unlike the ‘QR code on receipt’, the staff are responsible for scanning special QR codes displayed on players’ screens though the application. The staff with the application acts as an inspector. They check whether the players have done specific items purchased. If yes, players show the QR code from the game, then the staff scan it for players to redeem the virtual rewards. Although this ‘QR code inspector’ method requires extra efforts from local shops, they hold the gateway for verifying valid purchase behaviors. It eliminates the issues which some customers might sell the QR code of their receipts for others to claim the reward in the ‘QR code on receipt’ method. Moreover, decoding QR code is not always stable. As games are usually performance consuming, it is better to merely display QR codes in the games instead of scanning and decoding them.

Both methods are converting offline transaction to online environment, depending on which devices are responsible for displaying or scanning QR codes. For better experience, the process can make the real purchased items and the virtual rewards related. For example, a player may receive a piece of cake virtual item in the game after claiming a valid purchase of a real piece of cake in the advertiser’s shop.

In addition, QR code is just one of the methods to connect the real and virtual worlds. According to the equipment of devices and scenarios, QR code can be altered as Bluetooth, NFC (Near Field Technology), Wi-Fi etc.

7.1.2. Exchanging values between local stores and games

A campaign with this mobile game advertising solution requires an agreement between a local store and a game. The local store defines the expected actions from players such as buying a cup of coffee, paying a bill reached €10 or merely visiting the store. On the other side, the game sets virtual rewards such as coins, diamonds, new items or new characters. Importantly, a fair campaign should be fair to all the roles that are involved. It means the value of a player’s action, the virtual reward and the payment from the local store to the game, should be equivalent.

After setting a fair agreement of a campaign, it is possible to make the campaign better. Both ‘QR on receipt’ and ‘QR inspector’ provide basic experience of MR by claiming

rewards from the real world to the game. However, in order to produce stronger experience of merging the real and virtual worlds, the rewards should be related with the purchased item and the game. The expected actions from players defined by the local store may share some common concepts with the virtual rewards. Such common concepts build the connection between the real and virtual. For example, a player receives ten virtual diamonds in the game after purchasing €10 stuff from the local store. It provides a scenario that the game and the real world are connected. Furthermore, if a game has a virtual coffee as a game element, a campaign can be designed as the player receives a virtual coffee after buying a real coffee in the café. Obviously, the coffee example provides a stronger experience with merging the real and virtual world, but it demands more efforts when designing the campaign, while the diamond case is more universal.

In addition, when it comes to larger amount of local stores and games get involved, it is necessary to provide a platform of ad network. Through the platform, local stores can find proper games as partners and launch campaigns. Firstly, local stores and games should be registered as users in the platform. Secondly, they define the expected actions from players and virtual reward as ‘exchanges’. Thirdly, they label these ‘exchanges’ by tags so that the platform can identify the most related pairs of them. For example, in the coffee example above, both the café and the game should label their ‘exchanges’ as ‘#coffee’. Last but not least, the advertised local store sets a budget for the campaign. Nevertheless, the game has rights to decide whether it should accept the campaign according to the tags.

In short, the form of the proposed mobile game advertising solution belongs to around-game advertising. An ad will be shown as a game task. It is optional for the player to accept the task. As the ad is not blended into game elements and stays in non-game play scenes, it also belongs to interstitials type of advertising. However, as the rewards can be parts of game elements. When the rewards are related to the advertisers’ (local shops) assets or the rewards contain marketing information, the advertising placements are involved with game elements.

7.2. Implementation

An implementation as a prototype of the mobile game advertising connecting games with local stores has been done. It uses the ‘QR inspector’ method. It manages to verify an offline transaction through the QR code feature and provide an experience of MR. The implementation includes two mobile applications: the game application for players as the ‘game side’; the other for the staff of the local store as the ‘staff side’. The server handles communication between the ‘game side’ and the ‘staff side’ applications. The technology includes Python, Android development, QR code and JPush service (JPush, 2016).

Figure 20 demonstrates how the ‘game side’ application, the ‘staff side’ application, the advertising server (ad server) and JPush service work together. A player shows a QR code carrying its registration ID from the ‘game side’ application. If the staff of a local store agrees to claim rewards for the player, he/she can scan the QR code through the ‘staff side’ application. After a confirmation provided, the ‘staff side’ application sends the information with registration ID of scanned ‘game side’ application to the ad server. As soon as the ad server receives the message, it responds to the ‘staff side’ application. Meanwhile it finds the target ‘game side’ application according to the registration ID and sends an instruction as a push notification to increase 10 points of score for the target ‘game side’ application through the JPush service. In the End, the player successfully claims the rewards by getting 10 extra points.

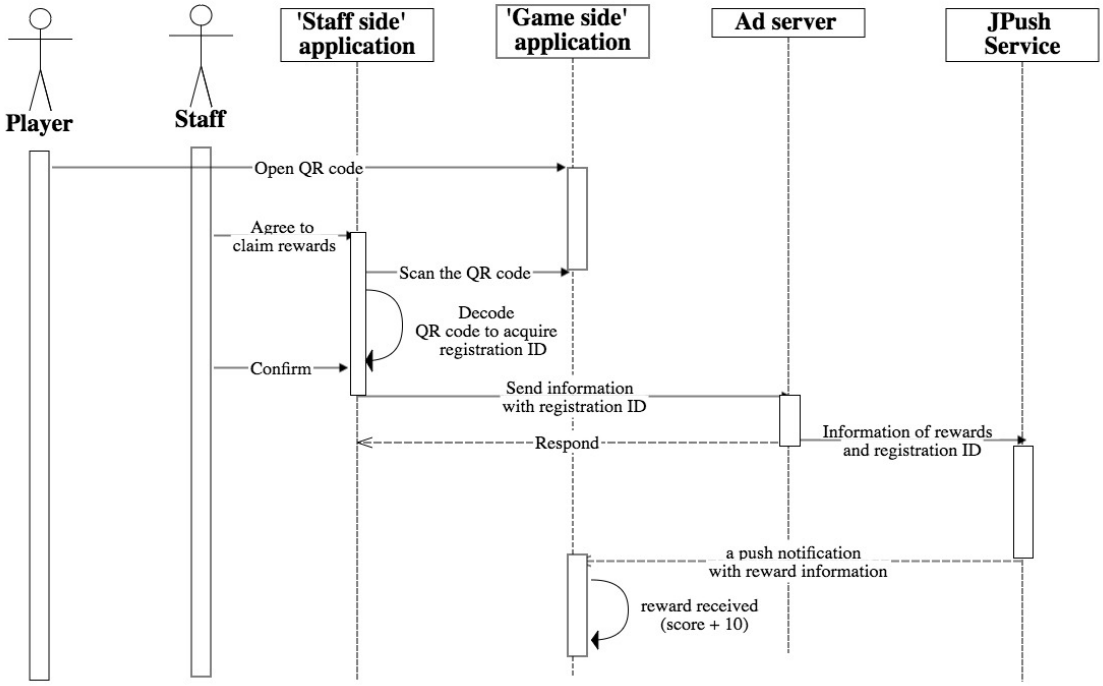


Figure 20 A sequence diagram of how to claim a virtual reward through the QR code

The ad server is developed in Python programming language with a web framework named Django[5]. It is responsible to respond the requests sent from ‘staff side’ applications and send notifications to specific ‘game side’ applications. It is hosted on Heroku[6], a platform as a service for developers to run applications in the cloud.

JPush (2016) is a free third-party platform providing push notification to mobile phones for developers. After registered a developer account, an application key will be assigned

[5] Django is a high-level Python Web framework. Djangoproject.com. (2016). Django. Available at: https://www.djangoproject.com/ [Accessed 29 Jun. 2016].

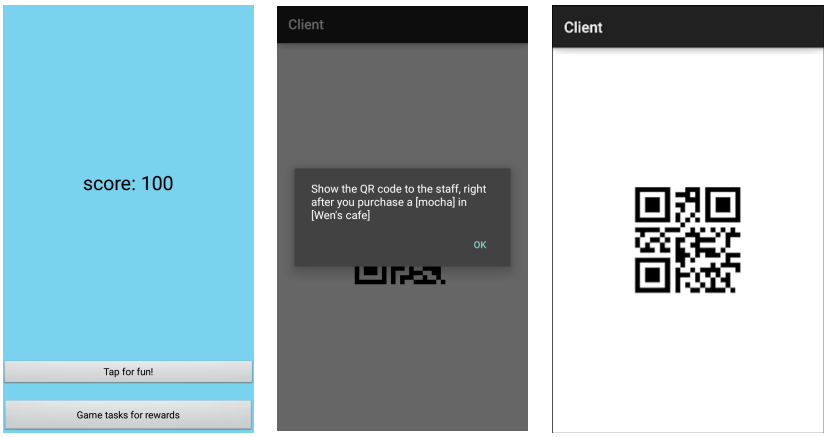
[6] Heroku is a cloud application platform for developers. Heroku.com. (2016). Heroku. Available at: https://www.heroku.com/ [Accessed 29 Jun. 2016].

to the developer. With this unique application key, the developer can use it as an authorized token in their applications to communicate with the JPush service. JPush provides push notification services both as broadcast to all devices and as a private message to a specific device.

7.2.1. From the perspective of players

A simple game application has been developed on Android. The game has a rewarding mechanism. It shows a score in the middle of the screen. The score is considered as a virtual asset in a game. The target for players is to increase the number of score as high as possible. Thus, earning more score is the primary goal in this game.

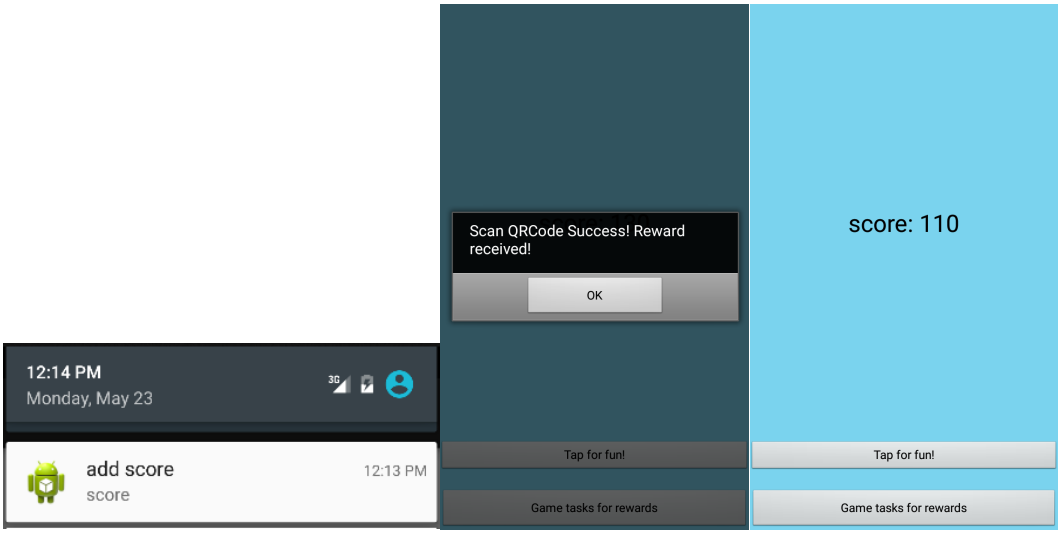
As shown in Figure 21(a), one way to increase the score is tapping the ‘tap for fun’ button constantly. Each tap has 1% possibility to increase the score by 1. The other way is to get more score by generating a QR code to be scanned by a ‘staff side’ application. A button written with ‘Game tasks for rewards’ is located at the bottom of the application. As shown in Figure 21(b), after tapping the button, a description of the game task is shown it indicates the player to purchase a mocha from Wen’s café.



(a) (b) (c)

Figure 21 The user interface of the 'game side' application

Meanwhile, a QR code which contains the information a registration ID is shown on the screen. The registration ID is generated by the JPush service (a platform which provides notification services for mobile phones). Before the QR code is created, the application checks whether it has the registration ID. If it does not have the ID, it sends a request to the JPush service to register the device which is running the application and retrieves the unique registration ID. With a specific registration ID, messages and notifications are able to be sent to the specific device through the JPush service. Thus, when the QR code from the ‘game side’ application is scanned, the scanning device gets the registration ID.



(a) (b) (c)

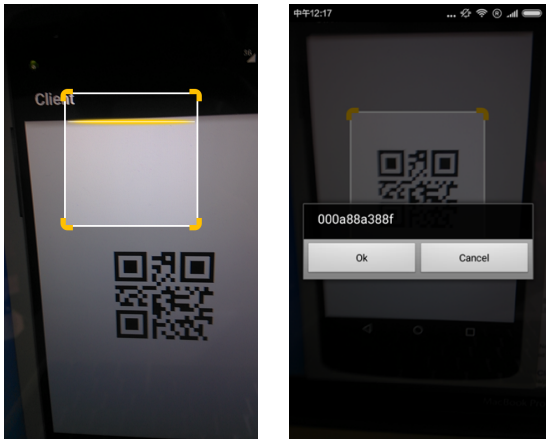
Figure 22 The 'game side application receives an extra score as a reward

When the ‘game side’ application receives a notification from the JPush service in Figure 22(a), it adds 10 points for the current score and prompts a message as “Scan QRCode Success! Reward received!” in Figure 22(b). As shown in Figure 22(c), the score has changed into 110 from 100. To receive the notification, the QR code must be scanned by the ‘staff side’ application.

7.2.2. From the perspective of local scores

Another Android application for scanning the QR code of the ‘game side’ application has also been developed. It scans and decodes the information in a QR code. After acquiring the information which is a registration ID from the ‘game side’ application, it wraps the ID and sends it to the ad server. If the ad server verifies the ID, it sends a notification to the specific ‘game side’ application through the JPush service.

The ‘staff side’ application is able to provide extra score for the ‘game side’ application. In other word, the scanning action from the ‘staff side’ application produces a reward. In the ‘QR inspector’ method, the staff of the local store is responsible to verify manually whether the purchase behaviors of players fulfill the demands of the game tasks. Through the ‘staff side’ application, the staff is authorized the ability to give virtual rewards to players.



(a) (b)

Figure 23 The 'staff side' application is scanning a QR code from a 'game side' application

Figure 23(a) shows the ‘staff side’ application which scans the QR code. Once the application is opened, the camera is activated and ready for scanning a QR code, as shown on the left side of Figure 23(b). By aiming the QR code inside the square, the application starts to read and parse it. In this case, it reads the message from the QR code and prompts a string, which is exactly the registration ID of the ‘game side’ application. After confirmation from the staff, the application connects with the ad server and send the message containing the registration ID.

7.3. Discussion

The proposed solution manages to connect mobile game advertising with local stores. It also helps to improve advertising performance. Advertising effectiveness as a main part of advertising performance, capturing customers’ attentions and deeper interaction are its important factors. The proposed solution motivates players to visit advertised local stores. Comparing with watching an ad from a phone, the advertised local stores get more attention from the players when they visit the stores. Moreover, after claiming rewards, some rewards can be interacted with and related to the advertised items.

Nevertheless, the proposed solution can not only enhance the advertising effectiveness, but also reducing the intrusiveness. Since an ad is transformed into a game task, it will not be displayed until the player actively opens it. In this way, the cognitive processes of the player are not interrupted. Moreover, such a permission based advertising gives players less intrusiveness. Therefore, the proposed solution has found a balance between advertising effectiveness and intrusiveness.

The proposed solution is relatively similar to mobile couponing. Mobile couponing provides discounts as incentives to persuade players buying their products, while the solution offers virtual rewards as motivations instead. In essence, they are the same as

both of them are costing local shops for game makers. Therefore, since mobile couponing has been accepted by local shops, participating the virtual assets in the mobile game advertising solution should be acceptable for local shops as well.

In order to receive feedbacks on the proposed solution, the author has interviewed two owners of their local stores: A Chinese restaurant called "Zhou's Place" and a café named "3D Crush". They are both located in Tampere, Finland, a city with approximate 220,000 people. Restaurants and cafés are good samples, as local stores rely on physically local services。The questions of the interviews are covered by three parts: 1) How they promote their business generally and what the expectations are, 2) How they use the Internet for promoting, 3) The opinions of the proposed mobile game advertising.

Both of them are actively using social media such as Facebook Page and Twitter for self-promotion. The café posted ads as banners on Facebook to promote a special in-house event. But the result was not satisfying at all as the owner of '3D Crush' said. Nevertheless, the restaurant has launched a campaign via an online market place named Groupon[7], where customers can purchase voucher in advance with discounts. The owner of Zhou's place was happy about the result because it actually increases the number of customers and sales. In addition, neither of them has posted ads on conventional media such as newspapers and magazines. Although both of the interviewees are aware of brand awareness, increasing direct sales is primary purpose for them.

After explaining the proposed mobile advertising solution and showing the prototype to them, both of them are impressed as it can produce extra direct sales. As its scanning mechanism is similar with Groupon's, the owner of the restaurant found it familiar and easy to use. Meanwhile, the owner of the café mentioned that the proposed solution can attract mobile gamers to visit local stores. He as a gamer himself believes it is hard for local stores to target gamers, but this solution provides a new opportunity. Additionally, both owners consider 'QR inspector' method is acceptable. However, they are both not care about what rewards the players receive, as well as the relevance between their advertised real items and virtual rewards.

To summarize the interviews, both the restaurant and the café prefer to launch advertising campaigns which can increase direct sales. They found the proposed solution and prototype interesting and creative. They believe more customers can be attracted through this mobile game advertising. From the perspective of local stores, the 'QR inspector' scanning method is acceptable.

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7 Groupon offer daily deals at restaurants, retailers and service providers.(2016). *Groupon: Deals and Coupons for Restaurants, Fitness, Travel, Shopping, Beauty, and more.*. [online] Available at: http://www.groupon.com [Accessed 22 Jun. 2016].

However, another mobile game advertising concept allows players to convert the points achieved from their games into tangible rewards (Komulainen et al., 2013). It also manages to merge the virtual digital game with the real shops through mobile advertising. Such tangible rewards are incentives for players to watch the ads in order to the advertiser's location where they can redeem the rewards physically. It is proven that this concept with tangle rewards is positive for advertising effectiveness. Players are willing to take actions to redeem their rewards. Moreover, Komulainen et al.'s concept using tangible and location-based rewards have positive influence to the players' attitudes toward game advertising. Its non-intrusiveness and maintaining playability help to improve user experience in mobile game advertising.

Both the proposed mobile game advertising solution and Komulainen et al.'s concept improves advertising performance. Nevertheless, the proposed solution also provides players an option to get virtual items without spending real money. Furthermore, it can enhance the relevance between the game and the real environment by providing virtual rewards which are relevant with the actions they take in the real world.

8. Conclusion

A tool for connecting mobile game advertising with local stores has been developed. It is proven that a mobile game and a local store can be connected with each other through a QR code. On the basis of this mechanism, the game maker and the local store can agree with what values are exchanged in a campaign. In this mobile game advertising solution, it has three elements that help improving user experience for advertising. Firstly, it provides User-friendly interactions. It utilizes a QR code as a portal to connect objects between real and virtual world. Secondly, a stronger relevance between the real items from local stores and the virtual items in games results in better experience for merging the real and virtual worlds. The relevance helps players to accept game advertising. Moreover, when a virtual object which is highly relevant to a real object is acquired through MR, the sense of interaction also can lead to better user experience. Thirdly, the proposed mobile game advertising solution never interrupts the player. The ad is shown only when the player voluntarily opens it. Therefore, the proposed mobile game advertising provides friendly interaction, relevance between the real and virtual world and non-intrusive ads. They form and improve a better user experience for mobile game advertising.

In order to understand mobile game advertising better, a reformed game advertising conceptual framework has been presented. Game advertising is divided into three different categories base on the purpose of games and the involvement of advertising.

All parties involved get benefits from the solution, which connects mobile game advertising with local stores. For players, except watching ads and in-game purchase, now they have another option to get virtual assets in games. They can purchase an actual item from a store while collecting virtual rewards in a game without spending extra money.

For local stores, it increases sales and brand awareness. When a player receives an ad as an optional game task, the information of the advertised store such as its name, products and location are exposed. It helps increasing the player’s brand recall towards the store. Moreover, when the player decides to visit the advertised store, he/she gets more influences from the store. Meanwhile, the store has successfully attracted more customers through online advertising. At last, if the player accepts the task and follows the instructions to purchase specific items, the store is actually gaining sales. This sale which is led by the ad is traceable so that the store can calculate the ROI. Notably, the concept is similar to applying mobile coupons, which the advertised store contributes a part of the profit to attract more customers. Instead of giving direct discounts in mobile coupons, the advertised store gives the player virtual rewards in my mobile game advertising solution. It attracts more customers who prefer virtual values in games than actual discounts.

For games, the solution provides another method of game advertising. In the reformed game advertising conceptual framework, the solution belongs to interstitials of around game advertising. Video ads will only be shown with the permission of players, and displayed in non-game scenes. Furthermore, as MR helps improving user experience, theoretically a game can provide a better user experience of game advertising to boost the advertising performance.

In conclusion, a solution has been found that help players, local stores and games to be involved in mobile game advertising. It shows benefits for all of them: players get virtual rewards, local stores can have their sales and brand awareness increased, and games have another way to monetize. Moreover, a prototype has been implemented to prove the solution is feasible. In addition, it expands the extents of mobile games and local stores. It makes the user experience of mobile game advertising get improved.

8.1. Limitations

This thesis has mentioned two methods for connecting games with local stores: ‘QR on receipt’ and ‘QR inspector’. The reason of choosing the ‘QR inspector’ because not all cash registers are capable of accessing the Internet and printing QR codes on receipts. However, the ‘QR inspector’ method is a compromise. Though having a ‘staff side’ application installed on a phone is not difficult, the way of verifying a valid transaction requires extra effort from the staffs of local stores. It means the staff have to learn how to use the application and have more responsibilities. In addition, manual verification is not efficient and may easy to cause errors.

The chosen research methods are literature review, analysis, implementation and interview. As the existing researches of connecting mobile game advertising with local stores are limited, the author introduced online advertising, game advertising and MR in order to merge them as a new concept. It is proven that MR has positive effects on user experience. Theoretically it leads to user experience improved in the mobile game advertising. However, surveys are needed to prove this theory.

The purpose of the implementation is to prove the concept of connecting mobile game advertising with local stores is feasible. It has been developed as a prototype, which means there is a lot to be improved. The ‘game side’ application is just a basic simulation of a game by count the scores. Its QR code feature is highly coupling with the application itself. It is better to develop a plugin for developers to add in their games. For the ‘staff side’, it does not have a login system. In the concept of my mobile game advertising solution, each claimed reward will cost the advertised local store to the game makers. Thus, it is important to verify the user of the ‘staff side’ application is authorized. Lastly, the ad server only handles the route to handle request from ‘staff side’ application and redirects the notifications through JPush service. It should track all the claimed transactions and display as charts for advertisers from local stores to

analyze the ROI. Furthermore, as an ad server which provides a platform for game makers and advertisers, it should help them to find their proper partners to launch campaigns.

8.2. Future Work

In the future, a real advertising platform as an ad network is expected. On the platform, marketers of local stores can define certain products to be involved in a campaign. They are able to promote to targeted players as potential customers by placing ads to proper mobile games, according to the relevance of tags. For game makers which would like to join the platform, they can add the plugin to their games and then reach all the resisted local stores. Moreover, the platform is not limited to games, any applications can provide virtual assets as rewards are qualified to join the platform.

The way to connect mobile game advertising with local stores can go beyond a QR code. Other technologies such Bluetooth and NFC (Near Field Technology) are also capable of bridging the reality and virtuality. Moreover, if all the transactions in local stores are occurred through online payments, it is possible to verify the transaction and claim rewards automatically. In this way, a more seamless experience of MR and mobile game advertising with local stores is provide.

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